COAL AGE

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THE New Zealand Arbitration Court, created for the settlement of labor disputes, is the most successful body of this kind in the world. It is not bound by precedent, nor hampered by technicalities, and having legislative, as well as judicial powers, may do its best to attain fair and reasonable wages within the limits fixed by economic law.

The greatest danger connected with the just and equable distribution of wealth lies in our proneness to forget there is such a thing as market value, and, as a consequence, we often ignore the relation between what is desirable and what is possible.

As the system in New Zealand now stands, both strikes and lockouts are illegal; the piece-work system is forbidden, a minimum wage is defined for practically every trade, and the right of unionists to preference of employment is recognized. Conciliation has been declared a failure, the belief prevailing that mediation and compulsory arbitration cannot be combined. The Court reserves the right to make the contracts that exist between workmen and employers.

The aim of the Arbitration Board is intelligently set forth in the following words of one of its members: "The duty of the Court is to pronounce such an award as will enable the particular trade to be carried on, and not to impose such conditions as would make it better for the employer to close down his operations, or for the workmen to cease laboring, than to conform to them."

Compulsory arbitration has resulted in making wages more rigid, because of the difficulty met in changing the pay of one class of men without making many other changes, so as to uniformly adjust conditions in closely connected trades. There is also the inefficient or no-profit employer, who opposes the raising of wages on the ground that the slightest concession would plunge him into bankruptcy. His protests have their effect on the Arbitration Court.

Among the educated people in New Zealand, the belief prevails that any attempt to lay violent hands upon the profits of employers would put an end to all business enterprise, and thus destroy the very source from which the wealth is drawn. From such an idea, it is but a step to the position that wages are determined chiefly by economic laws, and the Court can cause only slight deviations from the valuations of the market.

The Arbitration Board has abolished "sweating," and strikes have been prevented. It is a question, however, whether the men would not have gained as much by dealing directly with their employers. It is admitted by all that wages have not increased more than the cost of living; the advance in the former over a period of 12 years has been in the ratio of 84.8 to 104.9; the cost of food increased in the ratio of 84.3 to 103.3.

Employers have been inclined to throw the blame for the high cost of production upon the Arbitration Court. Their idea is that the present method of settling disputes has added to their operation charges, not so much by fixing minimum wages as by granting limitation of apprentices, prohibition of piecework and other restrictions.

The "go easy" way of working has gained ground in New Zealand in recent years. As in other countries, the tendency of trade unionism seems to be toward a levelling down, which discourages capable men from doing their best work, and results in industrial inefficiency.

The actual results of government ownership of mines, federal competition in business, old-age pensions, and the effect of radical labor legislation in New Zealand will be discussed next week.

Fireproof Coal Washery, Panama, Ill.

By John A. Garcia*

This modern plant of 1200 tons daily capacity is of concrete and steel construction throughout. It washes all material passing through 3-in. screens at the tipple and makes five sizes of coal. Its greater efficiency, lower cost for operation and maintenance and longer life make this installation economical as compared with the more usual timber structure.

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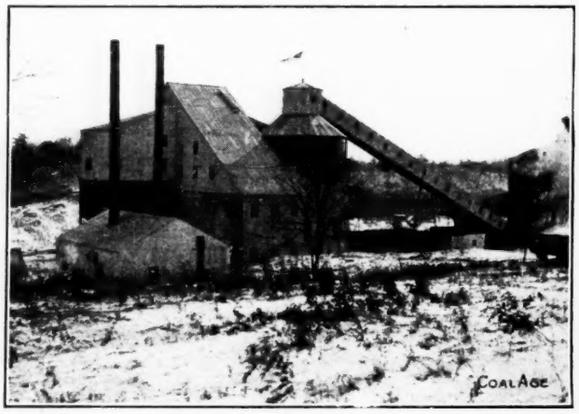
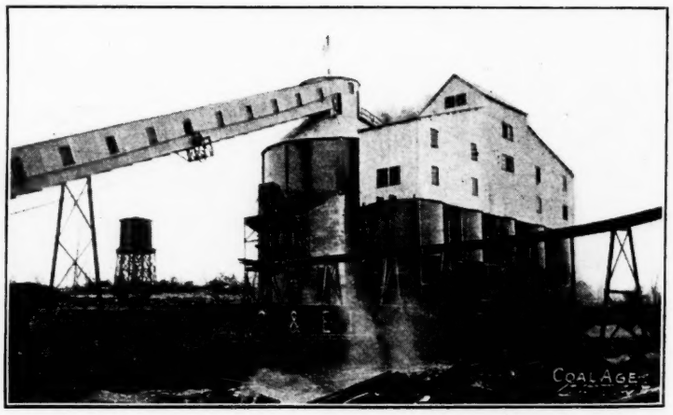
One of the main objections to coal washeries is the fact that they have a bad habit of burning down and leaving the coal company with a collection of contracts for washed coal and a lack of contracts for raw screenings, a combination sufficient in itself to reduce the revenue of the average mine below the cost of production; and this condition, although quite common in the coal business, is none the less undesirable.

The Shoal Creek Co. of Panama, Ill., was confronted last March with the problem of a burned down washery and a box full of washed coal contracts, and out of this distressing predicament it has developed a really fire-proof coal washery. This plant is simple, compact and efficient as well as fireproof and yet cost but a little more than an equivalent design of wood construction. The Allen & Garcia Co. of Chicago was given the commission for designing and superintending the construction of the washery about the middle of June. On October 3, practically 120 days later, the plant put out 400 tons of washed coal and from that day has continued to operate regularly without hitch or breakdown, a record seldom equaled in washery construction.



COMPLETED WASHERY, PANAMA, ILL.



VIEW SHOWING STEEL WASHED-COAL BINS

The washery has an output capacity of 1200 tons per day and a storage capacity of 600 tons of raw coal and 550 tons of washed coal, a total of 1150 tons. The plant is rendered more or less independent of the continuous operation of the mine by the great capacity of its raw coal tank and the arrangement for unloading screenings which are shipped in from other mines—a part of the installation that is not yet in place.

BELT CONVEYOR TO WASHERY

A 30-in. belt conveyor 174 ft. centers and built on an angle of 20½ deg. conveys the 3-in. screenings which pass through the tipple shaking screen to the top of the raw coal bin of the washery. This bin is 36 ft. in diameter and 32 ft. high, is built of steel, with a conical bottom and is equipped with a Humphrey ladder, designed to carry coal to the bottom of the bin with practically no breakage.

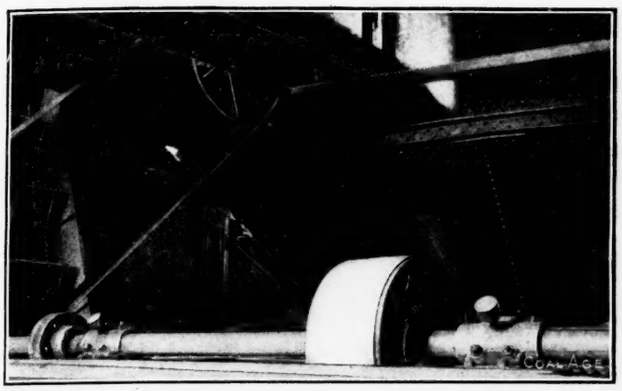
Coal is led from the storage bin to three Shannon jigs by a separate chute for each jig. Its flow in each chute is controlled by a lifting gate, which is operated from the revolving jig shaft and automatically feeds the proper amount of coal to each washer.

The Shannon jigs operate in a concrete tank which forms a part of one large concrete tank that is made up of several sections variously devoted to the refuse elevators, jigs and washed-coal dewatering arrangement. This tank, or series of tanks, is a massive body of concrete and although apparently expensive, is in reality the least expensive type of jig tank that can be built, because the bulk of the concrete construction greatly reduces its price per yard. Each jig has a normal capacity of 50 tons per hour so that the total jig capacity is in excess of the ordinary tonnage of the mine, which averages 2000 tons per day and makes about 50 per cent. of 3-in. screenings. The object of providing the excess jig capacity was to enable the washery to continue in operation up to the capacity of the mines should it be found necessary to shut down one jig. The refuse from the jigs, is released from the bottom of the tank by means of a gate and hand-controlled lever. It settles to the bottom of the refuse tank where it is caught by a bucket elevator, raised to a steel refuse bin and thence carried by a Koppel side-dump car to a spoil tank across the tracks.

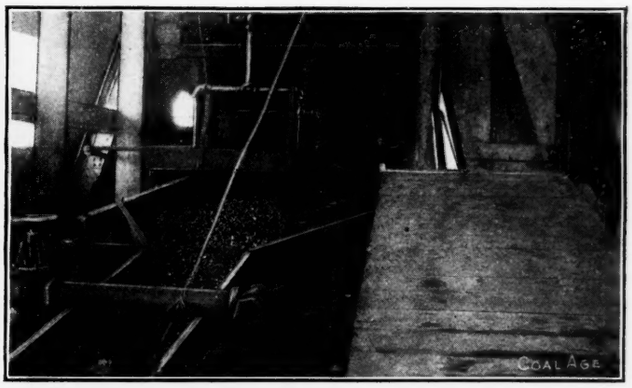
SHAKING SCREENS SIZE THE COAL

Coal from the jigs flows over steel aprons to the washed-coal tank, whence it is taken up by a bucket elevator to a head chute which carries it to the sizing screens. The first operation in sizing is accomplished by means of a double-deck Parrish shaking screen, hung on 1x10-in. ash boards and run at 120 r.p.m. This shaker makes perfect separation of the following sizes:—3-in. to 2-in., or No. 1 nut; 2-in. to 1-in., or No. 2 nut; and 1-in. to ¾-in. or No. 3 nut. Everything under ¾-in. is carried by chutes to revolving screens where it is separated into No. 4 and No. 5, sizes, the No. 5 passing to the dewatering tank and thence by a perforated bucket elevator to the loading bin.

The amount of machinery employed is reduced to a minimum, the whole equipment practically resolving itself into 3 jigs, 3 elevators, a No. 6 centrifugal pump, a steam pump and the separating screens. This entire outfit is driven by one double engine, connected by rope drive to a line shaft and thence by belt and chain drives to the various units.



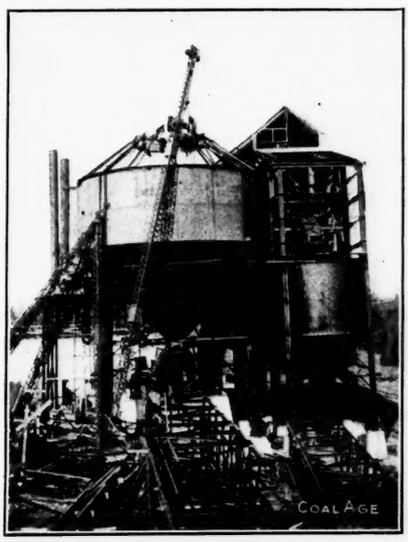
INTERIOR VIEW NEAR RAW-COAL BIN



SHAKING SCREEN, SIZING NO. 3 WASHED COAL

The raw-coal conveyor is driven by rope drive from a single 40 h.p. engine in the yard near the tipple.

The five washed coal bins are each 18 ft. in diameter and 22 ft. deep, with conical bottoms. They are duplicates in design and construction and their shop and erection costs were quite low on this account. The bottoms of the bins are provided with heavy cast iron thimbles, having 15-in. openings and the flow of coal is controlled by slide gates which are moved back and forth in the direction of the loading track, by hand levers. The coal is allowed to flow into a car until it reaches the height of the bin gate and then the car is dropped slowly down the track, thereby giving each car load the neat and trim appearance that is so important to well prepared coal because the best screened coal, if loaded in a slovenly manner, at once creates a bad impression that its real merit can hardly overcome.



VIEW DURING CONSTRUCTION

FIREPROOF CONSTRUCTION

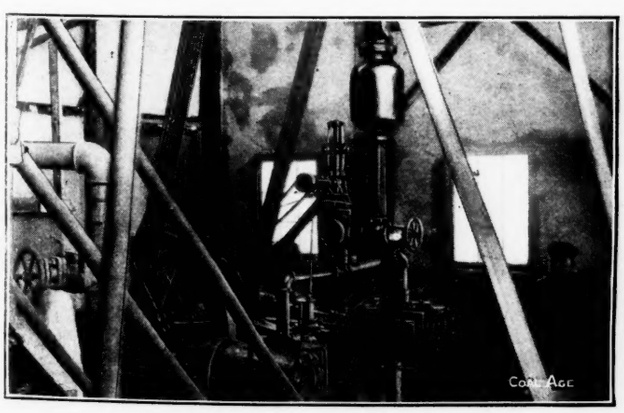
The roof and upper section of the washery building and the conveyor runway are covered with No. 22 and No. 24 gage galvanized corrugated iron. The lower section of the main building is enclosed in Hy-Rib and cement. The engine room floor is of cement and the walkway of the conveyor structure is of Hy-Rib-cement construction. The hand rails are gas pipe and excepting for a few temporary walkways and hard maple stair treads there is nothing to burn in any part of the building.

The secret of the low first cost of the structure lies largely in the design of the structural steel, placing metal where it belongs and eliminating unnecessary members, and also in the compact arrangement of the mechanical units in order to economize space. The entire operation may be seen and controlled from either the jigs or the driving engine and it is the ambition of the coal company's management to operate the plant with two men—one at the jigs and one on the refuse car with, of course, the usual labor for spotting and loading cars.

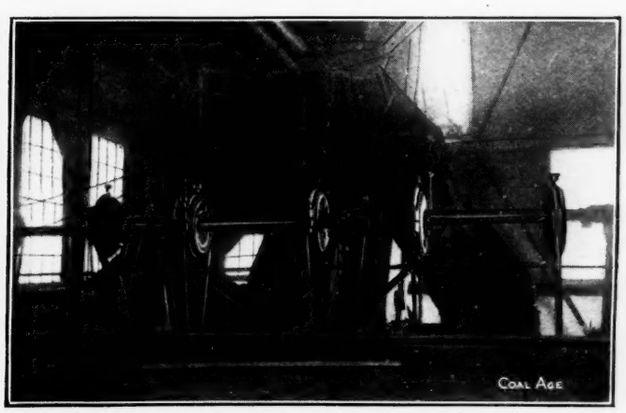
Since the raw and washed coal tanks are protected by a rust proof paint—"Cunninghams Coal Tar"—no deterioration of steel due to sulphur in the coal is expected, although the interior of the bins will have to be repainted occasionally (a Sunday job).

The washery uses a very small quantity of water per ton of coal and after the first day's run there was practically no waste coal in the refuse. Because of the high efficiency of the machinery, the steam consumption of the driving engines is less than in the old washery which had only two-thirds the capacity of the new plant.

There are many desirable features and conveniences in the construction of this washery. A walk is built along the outside line of columns at the proper height to facilitate the loading of cars and the operation of the slide gates. There are Humphrey ladders in No. 1 and No. 2 bins which prevent the breakage of coal when flowing into the empty tank and the circular form of the bins together with their conical bottoms allows the coal to run uniformly from all sides



WASHERY ENGINE AND ROPE DRIVE



SHANNON JIGS, SHOWING MAIN SHAFTING

to the gates. Every bin will empty itself perfectly, and a car of coal can be loaded in 5 minutes.

A supply of circulating water is taken from the dewatering tank by a No. 6 centrifugal pump and delivered to the head of all sizing screens, and also to a sluice way leading to the rotary screens. The fresh water supply is pumped directly from the reservoir, or may be taken by gravity from a storage tank placed on the hill at the proper elevation, and is delivered to the lower end of all screens, so that the various sizes of coal are clean and bright as they reach the bins.

While the machinery is arranged compactly and within an extremely small compass, every part of it is easily accessible. The conveyors are wholly within the building, and all shafting, gearing and belting are carried over platforms, easily reached by convenient stairways and walks. There is a walk entirely around the screens, and an outside stairway leading from the screening house to the top of the raw-coal bin. This latter can also be reached from the tipple by a walk alongside of the conveyor. The whole structure is notable for its extreme rigidity and strength.

An Economical Installation

Screenings in the Montgomery County, Illinois, field contain a large percentage of foreign substances, due to the sulphur streaks, blue band and bone coal found in the seam and to the methods of mining and loading, and it is expected that this type of washery will almost revolutionize coal mining practice in this field.

The greater average revenue which can be obtained from an installation of this kind, after deducting the cost of washing and the interest on the cost of construction, makes for an ideal investment. In addition, a wider range of sizes and an improved quality of product are secured, and therefore, a wider market and better running time, which, of course, also make for cheaper coal.

The structural steel for this installation was furnished and erected by the Wisconsin Bridge & Iron Co., Milwaukee, Wis.; the machinery was supplied by the Link-Belt Co., Chicago, and the entire plant designed and superintended by the Allen & Garcia Co., Engineers, Chicago.

A Mammoth Seam in Colorado

By Benedict Shubart*

A description of the preliminary development of an unusually large Western seam. The customary tipple has been replaced by a system in which the coal that is to be sized and loaded into railroad cars, is dumped at the railroad-track level, and then elevated to the top of the screens by means of an inclined conveyor.

*Boston Building, Denver, Colo.

Commencing Dec. 15, 1911, coal was shipped from one of the most remarkable mines in Colorado. The recently completed Laramie, Hahn's Peak & Pacific Railroad, starting at Laramie, Wyo., and running southwest to the North Park coal field in Jackson County, Colo., has opened up to market the immense seams of coal long known to exist in that field.

The Coal

During the last two years, E. R. Miller, Stewart Kennedy, and others, have been acquiring coal land and doing prospecting work in this section. For many years past the ranchers have driven from 75 miles around to this seam, digging the coal from an open pit, and hauling it to their ranches in wagons. But the full thickness of the seams was never developed until these men thoroughly prospected the field with a Loomis "Hollow-rod" drill, proving a top seam 65 ft. thick with 2 ft. of clay and 10 ft. of bottom coal, and three lower seams, 30 ft., 12 ft. and 18 ft. thick respectively.

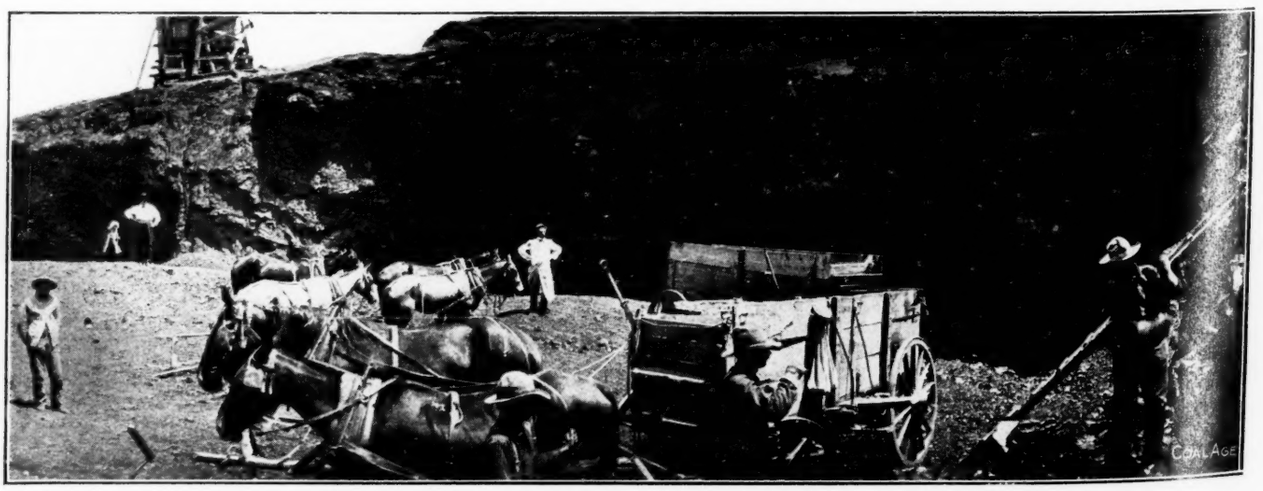
The Northern Colorado Coal Co., incorporated under Wyoming laws, was organized and has acquired 4000 acres of coal land and a considerable amount of ranch land for the purpose of raising supplies and forage.

The immensity of the seam is shown in the accompanying halftones. At present coal is still being taken from the open cut, about two acres, 35 ft. deep being exposed, but a slope is now being driven down the 16° pitch of the seam, and a 12x24-ft., three-compartment shaft is also being sunk which will tap the seam at about 112 ft. The mine will be opened up on the room-and-pillar system, the 10-ft. bottom coal being taken out first, and the balance being mined when the room is brought back.

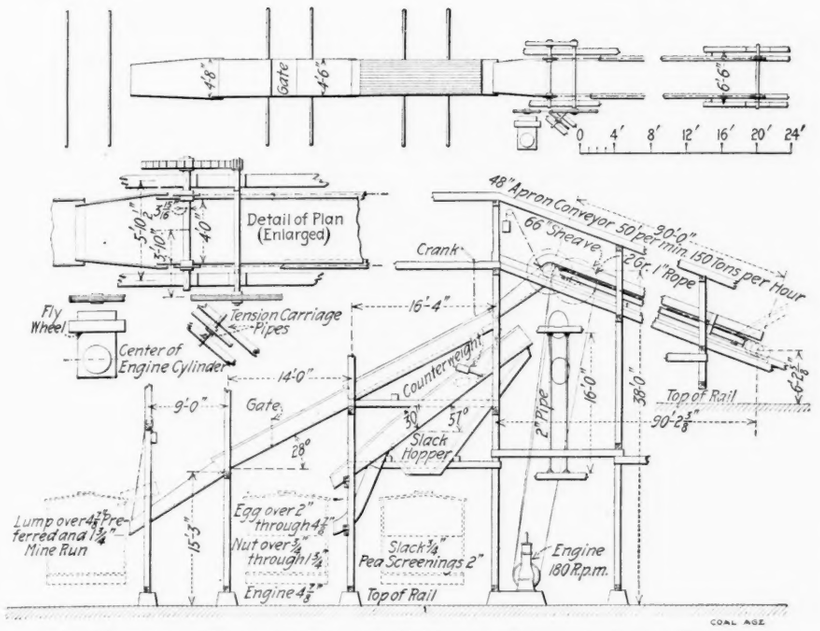
The coal is semibituminous, very similar in texture and appearance to the Rock Springs No. 1 coal. It is black, very blocky, and comparatively smokeless. The composition of the mammoth vein coal is as follows:

ANALYSIS OF THE COAL

	Per Cent.
Moisture	8.5
Volatile matter	45.2
Fixed carbon	44.2
Ash	2.1
	100.0
Sulphur	0.9
B.t.u.	11,000



Stripping Operations of the Northern Colorado Coal Co., at Coalmont, Colo.



THE NORTHERN COLORADO COAL CO.'S TIPPLE, SHOWING APRON CONVEYOR

The town of Coalmont, where the mine is situated, lies southwest of Laramie, 111 miles by rail. The very mountainous nature of the country made it impossible to construct a railroad from Denver or to branch off from the Moffat Road. The only practical outlet found was to the northeast and the rugged nature of the country made it necessary to select a very circuitous route for the railroad. However, by careful work, maximum grades of 1 per cent. out and 1.9 per cent. in have been obtained.

THE TIPPLE

The tipple equipment was designed by Stewart Kennedy, general superintendent of the company, and follows the lines which he has successfully used in the Sheridan, Wyo., fields. The pit cars will not be taken up the usual high trestle but will be dumped into a hopper set on the ground, as shown in the accompanying drawing of the tipple. The usual crossover dump, with car haul for returning the empties, will be used and the mine-run coal will be automatically taken from the hopper and elevated to the screens by means of a Link-Belt corrugated apron conveyor, which acts both as a feeder and conveyor. This will distribute the coal evenly to a gravity screen which will make the following grades of coal: Lump, egg, nut, egg-run (for locomotive use), mine-run, and slack. This system of screens is very flexible and efficient. When the mine is developed to the full capacity of 1500 tons per day, an elevator and rotary screen will be installed for re-screening, provision having been made in the plans for this. The entire tipple equipment was furnished by the Link-Belt Co. of Chicago.

The power plant consists of two, 16-ft. by 66-in., Nagle, horizontal, tubular boilers, 110-lb. steam pressure, which furnish steam for the auxiliaries and for a 100-hp. Ottumwa Iron Works hoist. The present plant is being installed merely as the nucleus of a more complete plant. All machinery is being installed in a permanent manner so that the proper additions can be made later to take care of the increased capacity. Electrical equipment will not be installed for the present.

President and general manager, E. R. Miller, with offices at Laramie will take care of the general Western sales. The Central Western trade will be cared for by the Havens, White Coal Co., of Omaha who will cover the territory of Nebraska, Iowa and Kansas. Complete traffic arrangements have been made between the Union Pacific Railroad and the Laramie, Hahn's Peak & Pacific Railroad, and the coal will be shipped out under the trade name of "Mammoth Vein Smokeless Coal."

ANOTHER VIEW OF THE STRIPPING OPERATIONS, AT COALMONT, COLO.

Coal Loading Booms at Annabelle Mine

Special forms of coal-handling machinery, designed to avoid breakage, are coming more and more into prominence. Despite improvements in the various devices for burning fine coal, the demand of the consumer is imperatively for large sizes, and because of the difference in price between large and small sizes, nearly all breakage in handling the coal results in a direct loss to the producer. With these considerations in mind, the engineers of the Four States Coal & Coke Co. have introduced a number of improvements over usual practice in the design of the tipple at the Annabelle mine, near Worthington, W. Va.

Perhaps the most interesting of these is the device for loading lump coal into cars, which is illustrated on the front cover of this issue. At the Annabelle tipple, all the lump coal passes over two steel-band picking tables, 6 ft. wide and having about 40 ft. of clear picking space. The loading ends, or booms, of these picking tables are, for a length of 26 ft., free to move in a vertical plane. They are continuous with the picking tables proper, being connected thereto by a trunnion. At the free ends are the tail sprockets of the picking bands, carried in trussed steel frames, supported by ropes from an overhead electric hoist. Attached to each boom is a short chute, which tapers to 30 in. in width. This concentrates the stream of coal, so that the car is neatly topped out.

The device is controlled by the loader, who stands on the picking floor of the tipple, immediately above the cars that are being filled. He thus has a full view of the operation, through large railed-off openings in the floor, and has the controllers of both loading-boom hoists convenient to his hand. Levers, operating the clutches which drive the picking bands, and electric signals to the mine-car dumps are also within his reach. The loader controls the movement of the railroad cars by means of a car retarder. This device consists essentially of a band brake with its lever, and a drum, on which is wound a wire rope that passes

over pulleys uptrack from the tipple and is hooked to the car. The grade of the track under the tipple is 2 per cent., so that this rope is always taut and the moving car absolutely under control.

On beginning to load, the empty car is brought into position, and the boom lowered until the chute is practically on the bottom of the car. The picking band is then started and the coal is carried on this to the end of the boom. It will be seen that there is thus practically no drop at all in loading the coal into the bottom of the car. As the car fills up, the loader gradually raises the boom without stopping the flow of the coal until he has one end of the car filled to the top. He then slowly drops the car so that the coal is always delivered to the edge of the pile already formed. When the car is full, he stops the picking band, while a new car is being dropped down. If it is necessary to stop the band for a considerable time, the loader signals to the dumper to cease dumping, in order to prevent an accumulation of coal on any part of the tipple apparatus.

The tipple is equipped with two cross-over dumps, having steam pull-backs, two lump-coal shaking screens, two picking bands, two fine-coal elevators and conveyors, and two revolving fine-coal screens. It is thus seen that the entire tipple apparatus is in duplicate, and either half can be operated independently of the other.

Particular attention has been paid to bypass arrangements, and the duplication of parts. All bearings, gears, etc., are cast steel, so that the risk of breakdown has been reduced to a minimum. The capacity of the tipple is 3000 tons per day.

The Coal Fields of Western Canada

By E. Jacobs*

An interesting and comprehensive compilation of various data on the coal industry in Western Canada. The geology and relative commercial importance of the different fields are briefly sketched. The industry as a whole is likened to the Pittsburg field in the United States and an equally bright future is predicted for it.

*Secretary, Western Branch of the Canadian Mining Institute, P. O. Box 645, Victoria, British Columbia.

In the course of the fourth of his series of lectures on coal to the fourth year class in geology at McGill University, Montreal, Quebec, in 1910, D. B. Dowling, of the Geological Survey of Canada, gave some interesting information relative to coal in Western Canada, as well as in other parts of the Dominion.

The preliminary statements attributed to Mr. Dowling in a report of the lecture published in a Montreal newspaper include the following:

Canada is destined to become one of the greatest coal-producing countries in the world. The deposits of coal now known to exist in Canada would supply the needs of the whole civilized world for the next 170 years. The coal deposits of Canada compare favorably with those of the greatest coal-mining countries in the world as to quality, quantity, and accessibility for mining purposes. The Welsh coal is supposed to be the best in the world, but in the Rocky Mountains of Western Canada there is coal which compares favorably with the best Welsh.

The production of coal in Canada has increased greatly during recent years. In 1902 it was only about 7 million tons, but during the three years 1907-1909, between 10 and 11 million tons a year were mined. There is as yet no reason to suppose that this production will seriously affect the future coal supply of the Dominion, when the extent of the coal fields and the available supply of coal are taken into consideration.

Workable Coal in Canada

New areas of coal-bearing formations are being found in the partly explored Canadian West. There are large areas that are fairly well known, in which it may be expected that coal will be mined. Parts of these are not yet within reach of transportation facilities, or require deep mining to recover the coal.

An estimate of the workable coal in Canada* gives a total of 173,736 millions of tons, as follows, in millions of tons:

Anthracite	470
Bituminous	71,391
Sub-bituminous	87,490
Lignite	12,385
	173,736

It is of interest to note in this connection that approximate estimates give Great Britain's supply of bituminous coal at 60,000 million tons and Germany's at 52,000 million tons.

Occurrence and Analyses

The following is an excerpt from a paper on "The Mineral Industries of Canada," contributed to the Internationaler Kongress, Dusseldorf, 1910, by H. Mortimer-Lamb, secretary of the Canadian Mining Institute:

The extensive coal areas of Canada are found in the Provinces of Nova Scotia and New Brunswick, in the East, and in the Saskatchewan, Alberta, British Columbia, and the Yukon Territory, in the West. The Eastern measures occur in the Carboniferous formation, while those of Central and Western Canada are found in the Cretaceous and Tertiary. The Eastern coal is entirely bituminous, the Central chiefly lignite, while in Western Alberta, British Columbia, and the Yukon the coal ranges in character from a high-grade lignite to anthracite. Lignites of still more recent age occur in Ontario.

Average analyses of Canadian coals from the respective areas are shown in the following table, compiled for the writer by Edgar Standfield, M. Sc., of McGill University, Montreal:

Coal Field	Moisture Left in Air Dried Sample	Fixed Carbon	Volatile Matter	Ash	Sulphur in Dry Coal
Nova Scotia					
Sydney	2.6	53	36	7	2.4
Pictou	1.7	5	30	13	1.2
Manitoba					
Souris	18.1	35	44	11	0.6
Alberta					
Edmonton	19.0	50	40	10	0.4
Cascade	0.7	72	15	13	0.7
Frank-Blairmore	0.8	57	26	17	0.6
British Columbia					
Crow's Nest	0.9	64	25	11	0.5
Nanaimo-Comox	1.5	51	36	11	0.9

Manitoba and Saskatchewan

In an official report,* published in 1909, D. B. Dowling gives "a concise statement of the area and probable contents of the various coal fields of the middle portion of Canada." Regarding the location and area of these fields, he says:

In Manitoba, the coal-bearing rocks occupy a small area in the southern part, underlying an elevated portion called Turtle Mountain. With our present knowledge we can define an area of about 48 square miles near the western end of this hill as being available for mining.

The Saskatchewan areas lie principally in the southern part, and are

*See Quarterly Bulletin of the Canadian Mining Institute, No. 15, June, 1911, p. 107.

*"The Coal Fields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia," by D. B. Dowling, Canada Department of Mines, Geological Survey Branch, No. 1035.

being mined on the Souris River. The elevation known as the Coteau is also composed of coal-bearing rocks, which continue westward in the Wood Mountains and Cypress Hills. This area, though not well prospected, contains possibly 4000 square miles within which coal may be found.

The Province of Alberta is liberally supplied with coal areas. The elevation of the coal formations subjected them to greater denudation than the harder rocks beneath; consequently little of this material is left; but in the wider valleys remnants are still found. These, from the superior quality and the amount of coal, form very valuable coal fields. East of the foothill area lies a great extent of coal-bearing rocks which are comparatively undisturbed. The coal in this region is well suited for domestic use, and as it is within the settlement belt, where wood is scarce, a demand for it is assured.

Another coal formation occupies the southwestern border of the province, with an area of 5000 square miles; the seams in this are of more value in the southern portion than farther north, or east. The principal mines of this area are to be found near Lethbridge.

Coal in Alberta

The coal areas of this province occur in three divisions of the Cretaneous. The lowest is exposed in long narrow belts in the outer ranges of the Rocky Mountains and the foothills. These areas, besides providing the best coal, are important in that they contain many thick seams, thus ensuring a large supply of valuable coal. The middle division, found occasionally in the foothills, is better known as the Lethbridge formation and is exposed over a large area in eastern Alberta; it furnishes a coal that grades from bituminous to sub-bituminous and lignite. The higher coal-bearing beds are well exposed in central Alberta. Those on the western edge of the area contain seams approaching bituminous, but in the eastern part the coal is sub-bituminous.

Mr. Dowling's latest published estimate gives for the province of Alberta a total coal-bearing area of 29,608 square miles, with an aggregate coal content of: Anthracite, 400 million tons; bituminous, 30,250 million tons; and sub-bituminous, 79,000 million tons; in all, 109,650 million tons.

Coal in Western Canada

The following excerpt from "Geology and Economic Minerals of Canada,"* gives an idea of the extent and importance of the coal fields of western Canada.

The coal produced in the Cordilleran region of Canada is almost entirely bituminous, and by far the greater part is of Cretaceous age. Coals of Tertiary age are known at a number of localities, as in the Nicola Valley, and near Princeton, Similkameen. The Tertiary coals are lignites, and sometimes form thick seams, as in the case of the Princeton area, where an 18-ft. seam outcrops on the banks of the Similkameen River.

On Vancouver Island, the coal seams occur in the upper part of the Cretaceous. Coal mining is concentrated in two areas on the east coast of the island, known as the Comox, and the Nanaimo coal fields. The Comox has an estimated area of about 300 square miles. At one mine, within a vertical section of 122 ft., there are 10 seams, with an aggregate thickness of about 29 ft., the thickest seam measuring 10 ft. In the Nanaimo field, two seams, one varying in thickness from 5 to 20 ft., and the other from 3 to 5 ft., are being mined. The coals are all bituminous.

In the Rocky Mountains and the foothills, the Cretaceous coal measures occur as basins among the folded and faulted Palæozoic and Mesozoic strata. The basins, generally stretching northwestward and southeastward, and sometimes for very long distances, are known to occur at intervals from the International Boundary to the Athabaska River, a distance of more than 200 miles. The coals within the Rocky Mountains are bituminous varieties, in places passing to anthracite, as at Bankhead and the anthracite mines in the Bow Valley. Eastwards, in the foothills, as the plains are approached and the regions of disturbance left behind, the lignite coals of the higher members of the Cretaceous are gradually encountered.

Within the mountains and the adjacent foothills, there are three coal horizons. The lowest occurs within the Kootenai formation belonging to the base of the Cretaceous, possibly the summit of the Jurassic. The seams of the Elk River and Crow's Nest basins lie within this horizon. The next group of productive measures is the Belly River, situated near the top of the upper Cretaceous column. The highest group of the coal measures lies in the Edmonton of early Tertiary age.

In Conclusion

Nothing like a review or summary of the coal resources of Western Canada will be attempted, but as an example of the view taken of the prospective importance of these Northwestern coal fields, only an excerpt will be made from an official comment of William Fleet Robertson, Provincial Mineralogist for British Columbia, contained in his annual report for 1909.* Dealing only with the Rocky Mountain coal fields, he wrote in part:

The Rocky Mountain coal fields, lying on either flank of the main range of the Rocky Mountains, respectively in the provinces of British Columbia and Alberta, are undoubtedly the most extensive coal deposits in Canada, and, what is more important from a commercial point of view, are the only large coal fields of first-class coal at present known on the Pacific slope, between Alaska and Mexico.

While it has been a matter of common knowledge in British Columbia that these deposits were large, it is questioned if more than a few people recognized their wonderful extent, or the enormous influence they must have on the future of the country. What this influence must be can best be demonstrated by an illustration of what the coal deposits of Pennsylvania have done for that state. They have made it probably the greatest manufacturing state of the Union—and the condition of Western Canada today is that of the Eastern United States 50 years ago, except that we may look forward to a more rapid development, due to the more general development of the rest of the continent and the improved transportation and other facilities now available.

It seems, therefore, that eastern British Columbia is destined to be, from the possession of its coal fields alone, the Pennsylvania of the Pacific slope, and that at no distant date.

Kentucky Mining Institute

The next meeting of the Kentucky Mining Institute will be held at Lexington on Monday, June 10. At the December meeting, a committee on program and entertainment was appointed; the members of this committee are Messrs. Hywel Davies, P. V. Cole and H. D. Easton (chairman). The Executive Committee cast a vote by mail and selected Lexington as the place to hold the June meeting. The institute won much credit by the excellent papers presented at the December meeting although the attendance was not large. These papers have been published in various mining journals and they are to be included with the papers read at the June meeting, in the transactions of the Institute. It is probable that the June meeting will last two or three days and that a side-trip will be arranged.

While it has been thought that electricity has been a contributing cause to some mine explosions, not a single explosion in American mines has yet been traced directly to its use.

*"A Descriptive Sketch of the Geology, and Economic Minerals of Canada," by G. A. Young, with Introduction by R. W. Brock. Canada Department of Mines, Geological Survey Branch, Ottawa, Ontario, 1909, No. 1085.

*"Report of the Minister of Mines, British Columbia, 1909," p. 163.

Shaft and Slope Construction, 201 Mine

By R. G. Johnson*

The construction of a concrete-lined shaft and slope in southwestern Virginia. The character of the surface was such as to make slope sinking extremely difficult. All concrete was placed by gravity chutes or by special chute cars. Details of designs and of contractor's plant.

*Engineer with the Dravo Contracting Co., Pittsburg, Penn.

In May of last year, the Clinchfield Coal Corporation started the construction of a large coal-mining plant on a comparatively new portion of its property, in Russell County, Virginia. The operation is located near Slemp, on the Carolina, Clinchfield & Ohio Ry., about five miles from, and in direct connection with, the Clinch Valley Branch of the Norfolk & Western Ry., at Keiser. A contract was awarded for the sinking of a large concrete-lined hoisting shaft, and a slope with an air-shaft connection, but the power plant, tipple and other surface equipment were constructed by the company itself, under the direction of consulting engineers.

Lower Banner Coal Seam

Since the opening up of the coal measures in this particular section of the state is of quite recent date, a brief description of the coal may be of interest. The seam to which the shafts were sunk is known as the Lower Banner, and called locally the No. 4 vein. Geologically, it is near the bottom of the Norton formation, which overlies the Lee conglomerate. This is a continuation of the Pottsville conglomerate, which, as is well known, extends from the Pennsylvania anthracite field through the Virginias, and thence south through Kentucky and Tennessee into Alabama.

The Clinchfield corporation has proved by extensive drilling the existence of a

Fig. 1. Typical Section, Lower Banner Seam

good many thousand acres of the Lower Banner seam. The coal, an analysis of which is given below, is high in heat units, and compares well in calorific power with the best New River and Pocahontas output.

ANALYSIS

	Per cent.
Moisture	0.70
Volatile matter	24.97
Fixed carbon	67.60
Ash	6.73
Sulphur	0.53

The columnar section, Fig. 1, taken in the heart of the Clinchfield company's field, shows what has proved to be an average thickness of the seam. Continuous low-vein mining machines are installed. These cut in a band of rash beneath the coal, the rash being loaded separately for consumption at the power plant, the high stack of which aids in the economical use of this fuel.

Modern Concrete-lined Shaft

In planning the shaft and slope, the most modern economical practice was followed. The shaft is concrete lined throughout and fitted with yellow-pine timber buntons and guides. Although reinforced-concrete and all-steel buntons have been placed in some of the latest concrete-lined shafts, the advisability of their adoption is a mooted question. Were it not for its excessively high cost, the reinforced-concrete bunton would be ideal. In using the all-steel bunton, a heavy section is required, because it is necessary not only to figure against a possible pressure of the ribs at the sides of the shaft, but also to provide against the corrosive action of the mine air and of water dripping from the cages, which is a far bigger factor than pressure, especially in sandstone country. A reinforced-

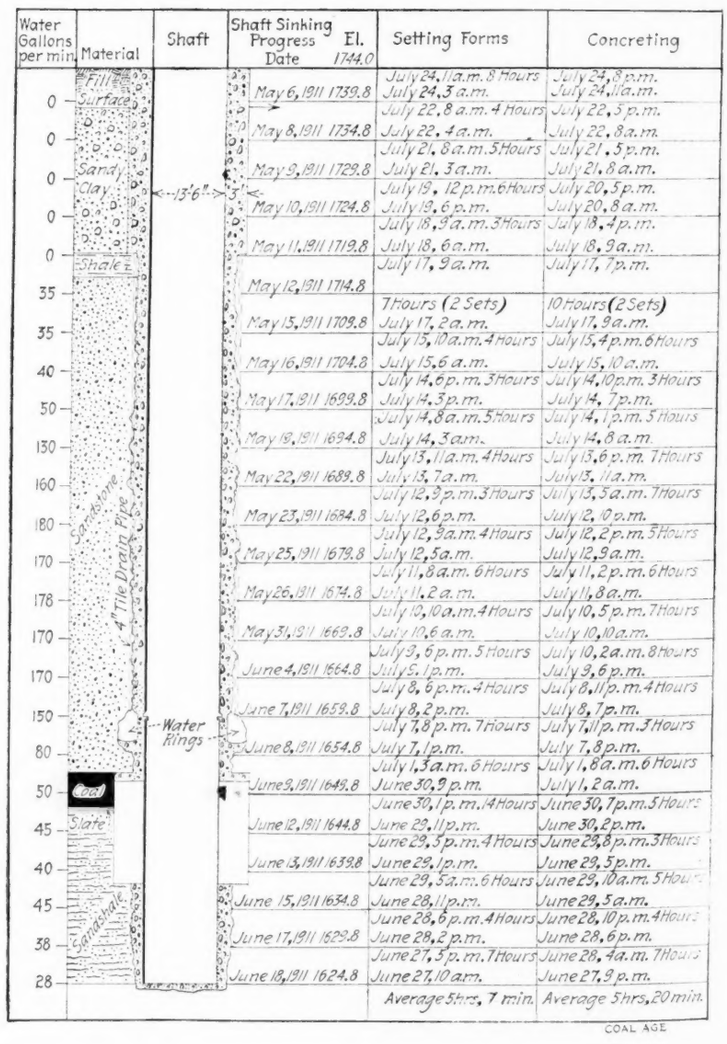


Fig. 2. Construction Record, Progress of Sinking and Concreting

concrete bunton and a steel bunton of fairly heavy section each cost about three times as much as timber in place in the shaft.

The policy of a company largely determines the character of the construction adopted, and plans for a shaft that will serve the purpose can be made to fit any reasonable budget, the only question being the degree of efficiency and the length of time the figured efficiency will continue. If the company knows its coal seam, and believes there is economy in so called "model plants," shafts can be made of watertight and fireproof construction that will last forever. The Clinchfield Coal Corporation maintained, and wisely, too, that the vital parts of their plant should be of the best construction, while certain other elements, which could be replaced readily and economically, might be of a temporary and less costly nature.

In sinking the shaft, no unusual features were encountered, except possibly the badly broken-up rock structure. This condition, while uncommon in western Pennsylvania and upper West Virginia, is not unfamiliar, however, to rock men in southwestern Virginia and in the lower sections of West Virginia. Drilling in crevicy, hard rock is difficult, especially on inclined holes, as the points of the steel bound when striking the bottom of a crevice at an angle.

Sinking Progress

While little water was struck at the start of the rock sinking, the amount rapidly increased as work progressed, and at a depth of 60 ft. the shaft was making about 180 gal. per min. However, this was very cordially welcomed by the coal company as a source of supply for the power-plant condensers, and its later almost complete disappearance was as sadly mourned. The coal was reached in good time, as reference to the construction record, Fig. 2, will show, something more than 100 ft. having been sunk in a little over a month. As soon as the coal was taken out, excavations were made for arches on both sides of the hoistways.

On the floor of the sump, a layer of concrete 6 in. thick was placed on a thin bed of broken stone, to form a level foundation for starting the lining concrete. The recesses for the arches in the concrete lining were sunk 10 ft. below the bottom of the coal, to allow for lowering the shaft-bottom entries, if necessary, in order to provide for the proper grades to the cages. The arches were carried only 5 ft. back from the face of the lining, and here again was shown the wise application of the company's plan to build foundations at present for future additions, which may be made as time proves more clearly the character of the coal.

Water Ring and Drains

Just above the coal, a ring was formed back of the shaft lining, to catch the water from 3-in. tile drains placed vertically between the concrete and the rock rib. These lines of tile were laid with loose joints and completely surrounded by broken stone. The shaft was well drained; but with the knowledge gained from the recent successful applications of the pneumatic grouting process for sealing the water-bearing seams encountered in shaft sinking, different drainage methods would now be employed and the flow of water entirely shut off by cementing the crevices. This process, recently described in the Feb. 24 issue of Coal Age, has since been used repeatedly in connection with shafts sunk in New York City for the city tunnel of the Catskill Aqueduct, and its complete success has attracted widespread attention among engineers and mine operators.

The concrete in the lining of the shaft was mixed in the proportions of 1-2-4, and that in the coping of the shaft in the proportions of 1-2½-5. The lining was designed to be 12 in. in thickness at the ends and 18 in. at the sides. It is,

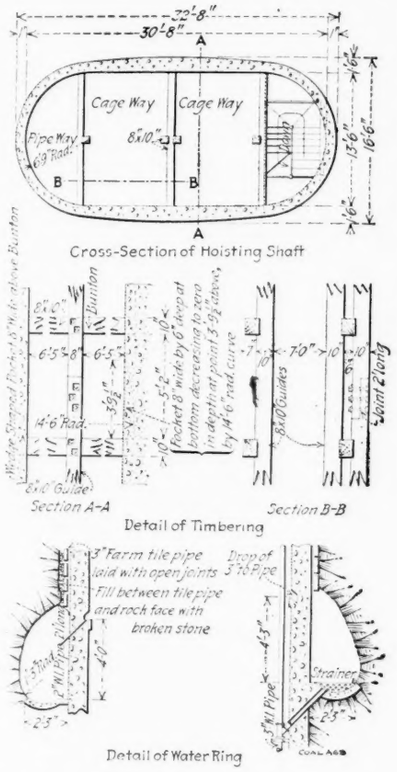


Fig. 3. Details of Shaft Construction

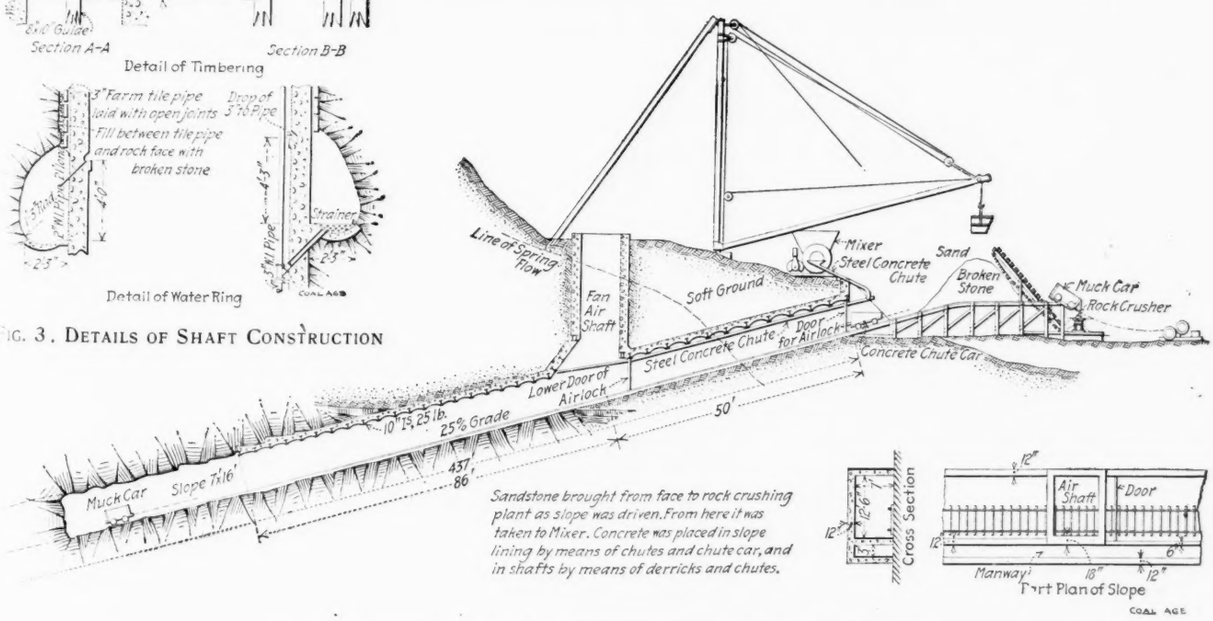


Fig. 4. Details of Slope Construction and Contractor's Plant

proved to be a decidedly quicker method than using buckets.

Slope Construction

The slope, put down in conjunction with this shaft, was located ideally, as far as outside track layout was concerned, but the excavation through the earth surface proved very difficult. The soil in this region is largely a yellow clay mixed with gravel and small boulders, and numerous springs, coupled with the rains, have caused the top soil to slide over the rock surface on many hillsides. Railroad cuts and roads in this section are often obstructed by such slides, and with little warning. It was evident after the slope had been started and was in only 20 ft., that a similar condition had here been encountered. The ground became heavy and difficult to tunnel and to timber by ordinary methods.

Timber centers were shortened and forepoling, such as is used in very soft ground, was found necessary. Although a possible 20 ft. of surface had been expected from the appearance of an outcrop of the rock strata not far above the slope mouth, actual working found the contractors tunneling for over 100 ft. before they reached a full rock section. The source of the trouble appeared when a particularly wet piece of ground was reached, and was followed by perfectly dry strata. A thick layer of sand, gravel and boulders had slid over a thicker stratum of clay, the spring water from the rocks above acting as a lubricant.

Timbering was required for a distance of 36 ft. beyond the earth section to prevent the caving of the thin rock overburden. Beyond this point, 136 ft. from the portal, to the bottom of the slope, the hard sandstone required no support of any kind over its entire 16 ft. of width, although the concrete partition wall put in later serves as such. The soft sliding nature of the earth section necessitated a change of plans for its permanent support, and a design, specifying 10-in. I-beams with concrete arches between them, was selected.

Concrete Placed by Gravity

The placing of concrete in the slope was done, for the most part, by means of long steel chutes. The lower sections of the 12-in. concrete partition wall and a portion of the roof arches were concreted by the use of a specially shaped car, having a chute attached. This method was entirely successful, the car being filled from the mixer at the slope portal and run down to a level just above the wall form, where a small portable chute was attached and the concrete run by gravity to place. The side-wall forms were filled with absolutely no handling of the concrete from the mixer, and the labor of tamping, and attaching the chutes to each carload, represented the only hand work done on any of the concrete at the slope bottom, 437 ft. from the portal and mixer. The only hand labor required in connection with transportating the concrete was that found necessary to insure a good job in placing the material in some of the roof arches, where the caps of the temporary timber bents were so close to the I-beams that there was not room for the chutes.

The original plans called for a Y-branch fanway, leaving the slope 70 ft. from the portal. The expense and hazard of tunneling and permanently supporting the soft ground for the main slope led the engineers to change their plans, omitting the Y-branch and constructing an air shaft over and into the slope about 50 ft. from the mouth. The concrete lining of this shaft was heavily reinforced with I-beams to resist the overturning moment of the hillside pressure, and by grading the surface at the shaft coping, an admirable fan site was prepared. An air lock was then placed in the slope, between the portal and the air shaft, for admitting supply cars to the mine, the whole making a unique and efficient arrangement.

Modern Power Plant

The central power plant for the mines, in the Dumps Creek division of the Clinchfield Corporation, is worthy of note, as it is without doubt one of the best in the bituminous coal fields. It is located near the shafts above described, on the Hurricane Fork of one of the main tributaries of the Clinch River. The present equipment comprises two 1000-kw., 6000-volt, 3-phase, 60-cycle Westinghouse generators, driven by Parsons turbines. An additional 2000-kw. machine has been purchased, and the building is so constructed that other units can be installed as needed.

The hot water from the Westinghouse surface condensers is pumped to cooling towers, situated over a reservoir, which has been formed by damming the stream about 200 ft. from the power house. Steam is supplied by three 400-hp. Wickes boilers with Cochrane feed-water heating system, all the boiler-room elements being placed with the future conditions in mind. Current for the haulage system of the No. 201 mine, of which the shafts are a part, is furnished by a 300-kw., 275-volt, direct-current generator, driven by a synchronous motor.

The shafts and slope were designed by D. R. Beeson, under the direction of H. M. Waite, then vice-president and chief engineer, and Carel Robinson, division superintendent. The construction work was done by the Dravo Contracting Co., of Pittsburg.

The United States imported 172,716 short tons of coke during the year 1910 and exported 984,562 tons during the same period.

Calcium Chloride

Among the methods for creating immunity from coal dust explosions is the use of calcium chloride. This chemical compound has the power of absorbing water, and under favorable circumstances such as are usually found in a mine, 100 lb. of the material will take up 115 lb. of water. Even in face of a strong sun, the salt will take up 50 to 60 lb. of moisture. It is easy to see, therefore, that in any ordinary mine, it will retain enough water to keep the places sprinkled with it in a perpetually damp and coherent condition. Dampness and coherency are the two requirements of a harmless coal dust.

A roadway well treated by the chloride should be as immune from an explosion as a dustless zone. But such a dust-free working is created at considerable expense and does not have the power of self-maintenance. The condition has to be continually renewed at the expenditure of no little labor. While on the other hand, the chloride moistens all the dust which falls and renders it innocuous, and does not need frequent attention.

Its principal sale today is as a road-binder. This use exhibits well its power of creating an agglomerate mass out of a collection of separate solids, and this would appear to be an argument for its use in mines where the roads are often in bad condition for traveling.

Pure calcium chloride is white and odorless. It is the presence of hypochlorite of lime which causes the pungent odor of the impure variety. The strong smell of the impure salt is due to the continuous liberation of chlorine from the decomposition of the hypochlorite.

Calcium chloride does not injure the hoofs of mules. It may be applied either in solution or as a solid. When used dry, it will soon obtain the necessary moisture from the air. It is reported that the Bureau of Mines is about to make an examination of the chloride to ascertain its desirability as a means of checking the extension of mine explosions.

Byproduct Coke Ovens

On p. 808 of Coal Age, No. 25 is given a list of byproduct coke ovens operating in the United States, as of Jan. 1, 1910. The following additions will bring it up to Jan. 1, 1911 (cf. *Journ. Ind. and Eng. Chem.*, March, 1912). *Koppers*: Woodward Iron Co., Woodward, Ala.; Tenn. C. I. & R.R. Co., Corey, Ala. *Rothberg*: Cleveland Furnace Co., Cleveland, Ohio; Lackawanna Iron & Steel Co., Lebanon, Penn. *Didier*: Lehigh Coke Co., South Bethlehem, Penn.

Without the dreamer industry would not exist, and without the worker it could not. Moral: Be both.

Current Coal Literature

The Best Thought Culled from Contemporary Technical Journals, Domestic and Foreign

Fire Fighting in India

The following remarks on mine fires in India are taken from the *Transactions* of the Mining and Geological Institute of India. They are contained in an article written by W. H. Pickering and R. R. Simpson. They state that the Koithi and Sibpur beds in the Raniganj coal field measure 14 ft. and 18 ft. respectively. Owing to this great thickness, to the readiness with which the coal burns and to the great strength of the roof, the problems presented by mine fires are unusually difficult.

"In considering the inherent dangers of coal mining in India, it is necessary to clear our minds of any prejudices due to experience in other countries. The conditions are very different from those which obtain in other coal fields. To be specific, the fire dangers are markedly different. The extraordinarily strong roof over the coal allows wide galleries to be driven to the full height of the thick beds, and the practice has been to cut up large coal areas into pillars by such intersecting galleries.

Air Blasts

If the pillars crush or are burned out, the roof will not fall until a large area is left unsupported. Thus when the fall does take place, an air-blast is inevitable. Except in a few isolated mines, it has not been the practice to divide the workings into districts by leaving barrier pillars of coal. Under such conditions, the only places available for stoppings are in the galleries, which are perhaps 20 ft. high and 15 ft. wide. A dam of such an area, unless of enormous thickness, will burst under the sudden pressure of an air-blast. In any case it would be impracticable to make gas-tight dams in such large galleries in a short space of time.

Therefore, the only alternative in case of fire in many Indian collieries is to cover over the shafts or to fill them up. The conditions at the mouths of many shafts make the covering of them difficult, and filling them with earth is an extremely slow process where the approaching galleries are about 20 feet high. Shafts are numerous and interconnected over large areas and in many cases there are no boundary pillars between mines even when these are worked by different owners.

Importance of Creating Separate Districts

Thus, a fire may involve the closing of a group of collieries; and this closing may be permanent if falls extend to the surface. Fire will spread with marvelous rapidity in the coal mines of India because the local falls of roof, which do much to check the spread of fires in other countries, are absent. When falls occur in a fire area they produce air-blasts which drive burning gases in all directions, and extend the fire to distant workings. Fortunately provisions against these dangers can easily be made by dividing the working areas into districts and panels with barrier pillars between them. All the galleries cut through these large pillars should be small, not more than 8 ft. wide and 8 ft. high, and dams should be put in them as soon as coal working is finished in the district which they serve.

Gas Engines for Collieries

By E. L. Chorlton

In continuation of his discussion on the advantages of the use of gas engines in connection with by-product ovens and producers, Mr. Chorlton shows that fans, pumps and mining machines may be driven directly by gas engines, and that with air compression to aid in starting, hoists and haulage drums can be similarly actuated.

In the pneumatic system the power is converted into air-compression, and although the efficiency of this method may be less than either of those previously mentioned, it is more flexible than the hydraulic system, and as to safety is superior to a direct use of the generated power. Consequently it is still much used, and practically all collieries have such a compressed-air plant. Moreover, an increase in its use seems likely, if any further restriction is put upon the use of electricity underground. The efficiency seems to average only 30 per cent. This, however, is largely due to causes which might be obviated, as, for instance, by the use of more efficient air engines in the mines.

The direct driving of air compressors by gas engines with an automatic control, which varies the speed according to the demand, although an eminently practical proposition, has not, at any rate so far, been adopted to any extent at collieries.

This automatic control of gas engines is easily applied to the two-cycle type, and the following is a description of a plant which has been in use for two years. So successful is this type of plant that it is almost always more economical to install it than any other, even at existing collieries, where it may have to be worked from a separate producer. Figs. 1 and 2 show the general arrangement of the plant. A producer is used here because no coke-oven or other waste gas is available. It is in a separate room, and is walled off so as to keep the main engine room clean. Important points in the general scheme are the accessibility and the ease with which the whole installation is manipulated. It has been so arranged that one man can easily attend to the entire plant, thus not only is the fuel cost low, but the labor charges are small.

A Two-cycle Gas Engine for Colliery Use

The engine is of the two-cycle double-acting type, and embodies the latest improvements. Its suitability for the actuation of air compressors is largely due to its being the only gas engine with a single cylinder in which an impulse is given at every stroke. The maximum speed of the engine is 120 r.p.m., and can be slowed down automatically to as low a speed as 30 r.p.m., its action being similar to that of a steam-driven compressor. The piston rod is carried through a stuffing box fitted with metallic packing, and is connected to an external crosshead, as in ordinary steam-engine practice.

There are two inlet valves, one at either end of the cylinder, and the exhaust gas is blown through ports set midway between them. This exhaust is followed by an incoming charge of scavenging air, entering through one of the inlet valves. These valves are operated by an eccentric rod from the main shaft through a pair of rolling levers, from

which a simple motion also operates the trip gear to the magnetos. The flywheel is 14 ft. in diameter, and weighs 13 tons. It is cast in two halves, with a barring rack round the periphery.

Control by Speed and Air Pressure

There are two methods devised for governing the engine; one of them consists of a governor mounted directly over the crankshaft, and driven by spiral gearing.

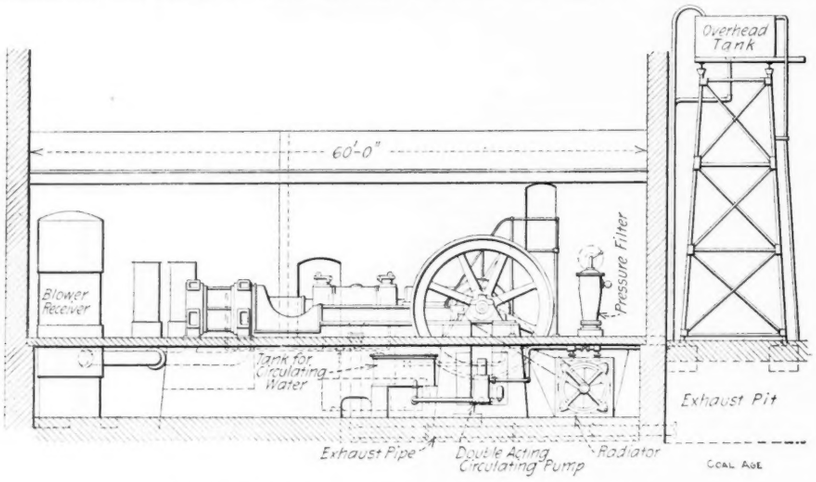


Fig. 1. Elevation of Gas-driven Air Compressor

The governing is effected by a small butterfly valve, connected with the governing rod, which permits just enough gas to enter the power cylinder to meet the requirements of the load. This governor is simple, and is fitted with an attachment by which the maximum speed can be adjusted within certain limits while the engine is running. It only comes into action as full speed is approached.

The other method provides a special dashpot governor, which controls the engine when the pressure of air in the receiver exceeds the required maximum pressure. It reduces the speed automatically in direct proportion to the amount of air desired, thus economizing fuel.

In my experience of compressed-air installations for mines, I have observed that the air was nearly always economically compressed, the design of the plant being evidently the result of considerable thought. On going below ground, however, efficiency seemed to have been entirely overlooked, as engines and pumps of the most uneconomical description were employed. So common does this appear to be, that I am inclined to ask: Who, and where, are the makers of efficient air motors in this country? In America, and in some other countries, much better plants seem to be used, and many schemes are in vogue for increasing their efficiency, such as the closed-circuit system. As the air pressure required for coal cutting and similar work is so low, the air might first pass through other plants for pumping, etc., before going to the cutters.

The Mechanical or Direct Scheme

Hoisting with a direct gas-engine drive presents several difficult problems, and up to the present, I am unaware of the use of this method at any colliery. It seems hardly possible to operate the main hoisting drum of a shaft by the use of gas engines unaided by any other device. There are usually so many stops and starts for decking, so much reversal of

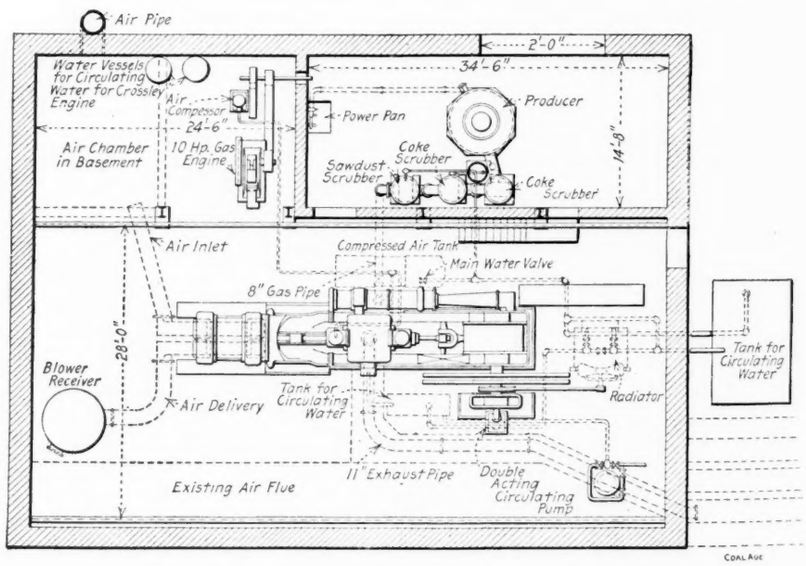


Fig. 2. Plan of the Above, Showing Gas Producer

the direction of hoisting, that we must look further, therefore, for some additions to the gas engine if it is to be made to meet the various requirements.

One method of circumventing these difficulties effectively would be to install a gas-driven hoisting engine, conforming in general layout to a standard twin-cylinder steam engine, the gas engine being of the two-cycle type, with its great advantage of quick starting. Behind each cylinder would be situated air cylinders, with the pistons coupled to and acting on tailrods from the gas cylinders in front. It will be seen, therefore, that with compressed-air auxiliaries the hoist can be run with an air engine being operated like a steam hoist when starting and decking, and making an inspection of the shaft,, etc. To accomplish in an economical manner the general duties of hoisting by the addition of such air cylinders, I propose to connect them with a reservoir of relatively small dimensions, the capacity of which can be easily regulated by the addition or subtraction of water.

How Air Reservoirs Could Store Energy of Cage

Supposing now that the gas hoisting set is running at full speed in the middle of the hoist; the air cylinders, being put out of service, are ineffective; when the period of deceleration commences to bring the hoist to an end, they are thrown into circuit with the air receiver through the operation of a valve gear, and then, acting as compressors, they rapidly raise the pressure in the receiver on a curve corresponding to the deceleration curve of the moving cages. Thus the kinetic energy of hoisting is stored in the air receiver, and the cages are gradually slowed up, until finally they are brought to rest by a brake. The pressure thus stored is then available for restarting the engine on the next hoist, the gas-engine cylinders coming into play as soon as movement takes place. Thus these cylinders would act alternately as compressors and motors. It is obvious that by this means a considerable economy could be secured, positive starting and control effected through the air cylinders, and all this with a considerably smaller gas engine than would otherwise be required. Of course, there is some loss in the compression and re-use of the air, but this is largely corrected by reheating it before

it is used by means of the exhaust from the gas engine, and, when necessary, by storing the power given out by the engine when running at high speed. Thus, the period of starting up when the stored air acts as a motor will be shorter than that during which power is being accumulated at the end of the hoist. The figures regarding this scheme are unfortunately not yet worked out in such a way as to enable me to present them in satisfactory form.

As Efficient as Electric Hoisting

With reheating, the overall efficiency may be as high as or higher than that of the electric hoist. More important at the moment, however, is the fact that it seems to make gas hoisting a distinct possibility. It is well worthy, therefore, of consideration, with the hope that ultimately further practical demonstration and improvement will result.

There are other ways of regenerative working which secure the object desired, and of these, one is by a hydraulic engine to replace the air cylinders, water being substituted for air and used afterward as motive power.

A further variation, which, however, the writer has not yet developed, seems to suggest possibilities of increased simplicity. In this case a balance rope is employed, such as was used in certain shafts many years ago, and an example of which I have seen working at the Wharncliffe Silkstone Colliery before mentioned. In this system I propose to use a similar rope or chain to lap onto a conical drum for the slowing part of the hoist and to unlap for the accelerating part, and, instead of attaching to the end a balance weight, to employ a connection to the piston of a small capacity air-storage cylinder, such as is used in the previous plants.

Fans and Pumps

The direct driving of a ventilating fan by means of a gas engine is not a difficult problem. The method is already in use, and therefore it does not need further discussion.

Pumping presents a much easier problem than hoisting. Because, in mining work, the pumps will be necessarily below the surface while the engine is above, a design with pump-rods would have to be adopted. In the usual type of pumping reciprocators, flywheels are not used to regulate their action. This absence of a flywheel renders it much more difficult to apply gas as a driving agent. In this non-rotative type, steam cylinders would be replaced by gas cylinders, with the addition of suitable hydraulic compensating cylinders, such as have been employed on Worthington pumps to even out the irregular driving force exhibited so plainly in gas-engine indicator cards. The ignition is controlled from the differential gear in a suitable manner. It is essential that such gas cylinders should be of the two-cycle type, for by this means only can the excessively slow speed of this type of pump be obtained. The provision for a continuous and even absorption of power from a source which creates it, discontinuously and unequally, is so difficult that a rotational pump driven by gas must be considered a much cheaper and more satisfactory proposition in every respect. Fig. 3 shows a general layout with pump-rods actuated through bell cranks and passing down the shaft. Pumping can otherwise be performed by wire-rope driving in the dips and in the more remote parts of the mine.

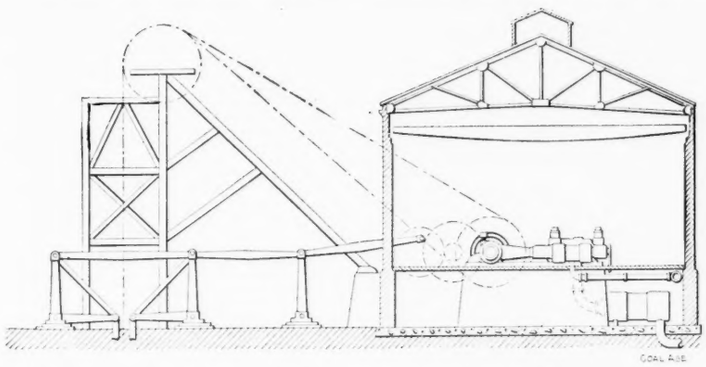


Fig. 3. Diagrammatic End Elevation of Colliery Plant Actuated by a Gas Engine and Mechanically Driven

Haulage and Coal Cutting

Many of the older collieries were equipped with direct mechanical drives, actuated by steam engines on the surface, and it does not seem that any insuperable difficulty should be found to result from the substitution of gas engines in place of the original prime movers.

Haulage is nearly always effected by wire ropes from haulage engines situated at the shaft top or bottom. In the direct mechanical system this drive is operated by means of a band rope actuated by a gas engine; and it is this rope, with its proneness to failure and its interference with hoisting, which is the undesirable feature of the mechanism. This objection, however, should not be insuperable, when the care and supervision necessary for all modern machinery are exercised. Such drives, worked by steam engines, are in common use, and seem to be both satisfactory and efficient. The writer has had the pleasure of seeing one or two modern installations of rope transmission, and he was impressed by the general simplicity and completeness with which these various requirements were fulfilled. The steam engine operating on the surface could easily have been replaced by a gas engine fitted, as an additional means of flexibility, with a reversing mechanism and the usual connections for starting by compressed air.

Coal-cutting machines, although often driven electrically, are more generally operated at the present time by compressed air. They can be operated effectively by wire ropes, as was done in the first mechanically operated machines. Efficiency could undoubtedly be increased if the various rope wheels were mounted on ball- or roller-bearings, the success of which for duties more onerous even than those in connection with mining has of late years been most marked.

The Chilean Coal Market

The demand for foreign coal continues good, notwithstanding the increased output of the Chilean mines, which amounted to more than 1,000,000 tons for 1911. The imports of coal for 1911 amounted to 1,274,118 tons, against 1,293,140 tons for 1910. Of this England furnished 705,762 tons, and Australia 526,643 tons, against 861,887 and 426,867, respectively, for 1910. No American coal was imported during 1911 and only 7260 tons during 1910. Only 51,861 tons of American coal have been sold in Chile during the past six years.

Briceville Explosion

E. N. Zern, assistant professor of mining, University of Pittsburgh, in an address to the Monongahela Y. M. C. A. Mining Institute, made the following reference to the Briceville explosion.

"Not long ago we read of a terrible mine disaster. These are the facts: The state mine inspector permitted a mine to be operated, the ventilation of which was provided by a fan installed within the mine. This mine was gaseous and dusty, and was neighbor to a mine where 10 years before 184 men lost their lives in an explosion. Open lights and electricity were permitted and their use can be classed in no wise as a precautionary measure wherever gas is generated, but the crowning fault lay in the use of that agency which, in the past ten years, has sent an army of men to the great beyond —black powder. In view of the dangers which were known to exist at this mine, I say that the loss of these 84 lives due to a blown-out shot is absolutely indefensible."

Who's Who—in Coal Mining

Devoted to Brief Sketches of Prominent Men, Their Work and Ideas

The fuel wealth of West Virginia has not been won by weaklings. In this little mountain state, Nature was lavish in storing her gifts, but all the good things were locked up in the fastnesses of her hills, and located far from the highways traveled by lovers of comfort and ease.

One of the pioneers in the development of West Virginia was Alexander Laing, father of John Laing, the present head of the State Department of Mines. The elder Laing emigrated from Falkirk, near Glasgow, Scotland, to America, in June, 1867. The family located at Hermitage, a small mining town, near Sharon, Mercer County, Penn.

John having been born in Falkirk, in August, 1865, was less than two years old when his father and grandfather came to this country. As soon as the family had located in Pennsylvania, the older men secured employment in the mines of Mercer County, continuing there for some years, but later changing their residence and devoting their time to mining in Mahoning County, Ohio.

John Laing entered the mines in what was known as the Spearman Shaft, Mercer County, Penn., at nine years of age, and his attention has been directed solely to the production of coal ever since. Mr. Laing accompanied his family to Ohio, and worked in the mines of that state until 1884, when they all moved to Fayette County, West Virginia.

John worked in the mines of the New River and Kanawha districts until 1891, when he gave up underground work and accepted a position as clerk in the store of the Rush Run Coal Co., in Fayette County. He was later advanced to bookkeeper, and as an additional duty, had charge of the company's payrolls. In January, 1892, when 26 years old, Mr. Laing gave up office work and took charge of the mine of the Red Ash Coal Co., as mine foreman. Five years later he was promoted to the position of mine superintendent of the Red Ash, Brooklyn and Cunard properties, three of the earlier operations located on New River.

In 1898, John was made superintendent of the mines of the Rush Run Coal Co., and in 1901, when a consolidation was effected, bringing together the Rush Run Coal Co., the Red Ash Coal Co., the Brooklyn Coal Co., the Cunard Coal Co., the Sun Coal Co., the Lanark Coal Co. and the Royal Coal & Coke Co., all located in the New River district, he was appointed superintendent of the combination. After this consolidation, the company was known as the New River Smokeless Coal Co., and was under the active management of Ferdinand Howald, one of the early settlers, who retired from mining in 1905, after having accumulated a considerable fortune. On the retirement of Mr. Howald, John Laing was appointed to succeed him as general manager of the consolidation.

JOHN LAING

During the latter part of 1905, the New River Smokeless Coal Co. sold its entire holdings to the Guggenheim interests, of New York City. When this deal was put through, Mr. Laing resigned from the new organization, and with a part of the proceeds received from the sale of his interest in the original company, he organized the Wyatt Coal Co., in Kanawha County. He also purchased four mines on Cabin Creek from the Cardiff Coal Co., and these properties, known as Horton Nos. 1 and 2, Oakley and Berlin, are still being operated under his personal management.

In 1908, John Laing organized the MacAlpin Coal Co., which concern is operating on the Virginian and the Chesapeake & Ohio railways, in Raleigh County, West Virginia. He is president and general manager of this company. In 1911, John organized the McGregor Coal Co., which corporation has a lease of 3600 acres, located in Logan County, West Virginia. In 1912, he organized the McCaa Coal Co., which concern is working a lease of 1000 acres in Gilmer County, West Virginia, on the Coal & Coke Ry. John is likewise president and general manager of this latter corporation.

On December 22, 1908, Mr. Laing took oath of office as chief of the Department of Mines of West Virginia, which position he has filled creditably, and to the satisfaction of both operator and miner. His term of office expires July 1, 1913, and although he expects to serve until the end of his appointment, he will not accept the office for another four-year term.

In his own words, Mr. Laing says: "My work as chief mine inspector has been both congenial and pleasant. I have at all times had the coöperation and assistance of the Governor and administration of the state, and my relations with the operators and miners have been unusually harmonious. While at times we have had a slight diversity of opinion, and although a few accidents have occurred, we feel that our efforts have been successful."

Having been raised in the mines from early childhood, and having filled every position from trapper boy to president and owner, John Laing knows the practical side of his business from A to Z. He is a plain man and a strong one. Having mined coal himself, he knows his men, and it is not difficult for him to grasp their point of view. A natural story-teller, John would rather spend an idle moment telling a "new one" than to attend a reception at the Court of St. James.

His education was secured in the college of "hard knocks," but the schooling he received is the kind you can't forget, and the man who can start as a trapper at nine and swim to shore early in life with several hundred thousand gold shekels on his back, has something thicker than water in his veins and stiffer than cord in his spine. Best of all in his climbing, John hasn't walked on the hearts of his friends, and used the bones of associates and acquaintances as stepping-stones to success.

Loyalty to friend and clan is not the least of his virtues, for what he hasn't done for "kith and kin" wouldn't fill a paragraph. Perhaps it's the Scotch in him, but I am inclined to believe its the size of his heart and not inherited instincts that is responsible for his desire to advance the "House of Laing" rather than the personal fortunes of John.

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This journal has a direct aim—a single purpose—which is to help advance the coal-mining industry. Its creed embodies the dissemination of knowledge and the free interchange of ideas among its readers, all of whom are invited to become regular contributors.

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COAL AGE

The Recompense of Labor

Were there but one individual in the world, it would be easy to determine the meet recompense of his labor. We could be assured that this solitary wight would receive, and could only receive, for his happiness and his sustenance what he gained by delving and spinning, less what was taken away from him by the rough hand of nature.

But, in the present, with a complex system of society, when some individuals take specialized parts of the corporate burden and others lightly shirk their responsibilities, we sometimes permit ourselves to believe that what is true of the unit man is untrue of the agglomerate unit, society. But it is certain, no matter how often we may overlook the fact, that society as a whole, cannot earn unless it works, and works efficiently, thereby creating wealth.

Wages are but tokens of the share awarded to the individual, representing his claim to a part of the universal wealth, and the attempt to issue these tokens without restriction will but cheapen them, because they do not call for segregated portions of the common store, but for such a part of the whole as the individual token bears to all tokens issued. Let us not fear, the wages of the world will buy the product of the world. No matter how liberally we recompense labor, the pay of the workmen cannot purchase more than what is for sale; nor can wages be so low that they can only purchase a part of all things salable. And this adjustment whereby the public's money and the public's property become equal automatically is provided in two ways—by changing the price or by controlling the product. The adjustment is foreordained, and for the sake of human betterment should be reached in times of depression by price reduction, and not by the idleness of the producer.

These are sayings so trite that we hesitate to make them. Unfortunately they are too often forgotten, and we hear it declared that class consciousness, liberal laws and the coming of labor into its own, express a sufficient reason why the workman is prosperous. But after all there can be no sufficing prosperity, unless the ground will produce and man will work intelligently at production.

The political intelligence of the American workman has not, in any way, been the cause of his personal well-being, and we fear his socio-political agitation will land him and the whole country further from his social ideals.

But it is with no feeling of satisfaction that we now proceed to condemn extensive rises in wages. It seems natural for every man to look forward to a time when his statement will run into three figures. When he has reached the highest point open to his intelligence, he naturally seeks to raise his class of fellow workers to higher levels of remuneration, in the expectation of personal advancement. He sometimes believes that this increase in wages will be taken from the profits of capital. But if he reflects, he must know it comes from his fellow workman, who must pay a larger price for the article he produces.

We cannot condemn him for shallowness of vision or for callousness toward his brother worker. The average capitalist sees no further than do his wage-earners and raises his prices regardless of the public weal or woe. So in this seeking of a larger wage, the worker commands everyone's sympathy. It is realized that no matter how inept, degenerate and feeble he may be, and few there are who can be thus described, his needs and those of his family are none the less urgent. He and they, as much as the intelligent, brilliant and strong, need sustenance and the luxuries of life.

But these can only come if there is a product of toil sufficient when divided to give an adequate share to each man. If the product sinks so low that there is not enough for all on the old standard of living, then "real wages" must fall, even if the "nominal wages" soar to suit the demands of agitators. The real wages, as Adam Smith has said, are the

materials desired by the workman, and exchangeable by him from the nominal wages given him by his employer.

The real wages of America have been high despite, and not because of, the deplorably high nominal wages. With virgin forests of excellent timber, with coal outcropping to the surface, with land unspoiled by endless tilling, with iron which can be mined by a steam shovel, with magnificent waterways, and above all with laboring men of a high degree of intelligence directed by enterprising industrial leaders and animated by the hopes which a large real wage inspires, there could not fail to accrue to workingmen an enviable opportunity. That this well-being was due to the men and to the land in which they lived, and not to any altered relation in the distribution of profits between capital and labor, is shown by the fact that both capitalist and artisan profited at least as largely as in any other country.

The only drawback to national supremacy has been and is now to be found in large nominal wages, and the accompanying high prices. But we are not the only people held back by such an encumbrance. New Zealand, Australia, and in a lower degree Canada are similarly hampered. All new communities, knowing how a large wage appeals to outsiders, offer it freely to encourage immigration of specially fitted foreign workmen. Able to pay such wages, even when elbowing their way into foreign markets by virtue of cheap raw materials and boundless vacant lands, capitalists do not hesitate to increase the rates of pay unduly.

Moreover, these larger wages have been paid usually to the invited guests of the nation; in early days, for example, the miner received more per ton of coal mined and loaded than the average day laborer got for a day's work. Today the glass workers, the tin-plate workers and the iron rollers, through their unions, have maintained, not the American wage, but the artificial wages offered to them before their entry on American soil, having held up the standard by selfish interferences with the laws of supply and demand.

High nominal wages shut or tend to shut the products of industry out of foreign markets. When nominal wages are equally raised in our country and in those competing, then there is no disturbance in business from such a rise, but when larger increases in wages are made here than abroad, the American product must find all its trade in the home market. Thus the work of consuls in building up a foreign trade is continually nullified by home conditions which are purely artificial and which aid no one.

The Bureau of Mines

Not a few organizations have been destroyed by the excess zeal of their friends, and such a result, the Federal Bureau of Mines has much reason to fear. The mining public is too well instructed to accept as official and authoritative all the statements that seem to emanate from Pittsburg and Washington. However, the average layman, unacquainted with the facts, is likely to be misled, and shaken confidence is sure to result when the public is at last correctly informed.

J. W. Paul has been credited with the statement that "at the explosion at McCurtain, Okla., 25 men were saved out of 100 in the mine." The alleged quotation does not declare that the men owed their lives to the Bureau, though the whole statement labors hard to create the impression that the Bureau is to be credited with the rescue of all the 25 men. Our readers will recall that eleven of the men escaped long before any member of the Bureau heard of the disaster. The others, possibly, may have been aided in their escape by the fact that the Bureau directed the recovery work and helped to reëstablish the air current in the mine.

Let the Bureau deny all attributions of bravery and judgment, which do not rightly belong to its rescue corps. Let it give due credit to the inspectors and the local rescuers who work so bravely to save their fellowmen. There is surely glory enough for all. The bravest are usually the most modest and the first to deny stories which overstate their achievements.

But there are other journalistic deliquencies besides those relating to mine-rescue work. A tendency of the advocates of the Bureau has been to lay claim to the origination of every mining improvement, forgetting that many of the developments have come from over sea. This does not show in the bulletins issued at public expense, but it does appear in reading notices scattered far and wide all over the country. These notices are the well springs of no little justifiable criticism and the Bureau must curb its friends or it will itself be curbed. From all sources comes the assertion that the nerve centers of the mining industry do not center in a common ganglion situate in the group of buildings at 40th St. and Butler, Pittsburg, Penn.

It should never be forgotten that the best friends of this organization are not the noisy press writers who know nothing of mining. Those who are working along the same lines as that body will recognize freely all its steady, honest and painstaking investigation. But gasconades and overstatements, whether made by the Bureau or by perfervid press journalists can only do harm. We would ourselves be the first to deplore the Bureau's besmirching and destruction, but these evils are likely to result if the present lack of conservatism continues to be evinced by those whose writings proclaim them accredited press agents.

Let it never be forgotten that we may wipe entirely off the slate all those foolish commendations to which the Bureau is not and never will be entitled, we can whittle away all the dross ornaments of editorial pens and there will nevertheless be much of which this governmental body and the people of these states may be justly proud, and we and they, are but at the threshold of their worthy attainments. Where so much is good, when false claims are unnecessary, there is no need to fear that the lopping of fallacious honors will leave Joseph A. Holmes and his associates despoiled of all honor. Let us hope that hereafter the Bureau will urge the press to regard and acclaim it with that measure of dignifying and honorable approval accorded the Bureaus of Standards and of Roads. Let it pride itself on the following aristocratic medieval motto, "Moveo et taceo." I move ever forward but I hold my peace.

Many annoying mine delays, caused by waiting for parts to be sent from the factory, can be avoided if only standardized, interchangeable equipment is used. The importance of this item in time saving cannot be overestimated.

Discussion by Readers

Comment, Criticism and Debate upon Previous Articles, and Letters from Practical Men

Timbering a Mine Parting

Answering Noah Burton, Anglin, Ky., COAL AGE, March 23, p. 786, who asks for the best method of timbering a mine parting under a tender roof, I submit a few sketches showing some of the methods I have adopted, in different mines. Each of these methods gave good satisfaction in the place where it was adopted. In timbering a mine parting, several conditions should be considered before adopting a method; as for example, length of service required of the timber; approximate weight it is expected to sustain; whether the siding will be temporary or permanent; whether the timbering will take up too much room and reduce the sectional area of the airway required for ventilation; whether or not the mine is in a good timber territory, or whether the timber will have to be bought and shipped in, and finally its cost as compared with steel I-beams, or T-rails.

FIG. 1. CROSSBAR AND SHORT LEG

Fig. 1 shows a method of timbering where the coal is reasonably hard and will sustain a good pressure. One end of the crossbar is notched into the coal, and rested on a plank to give it a better bearing surface. A wedge is then driven between this plank and the timber; or a pair of wedges can be used instead of a plank and wedge. This will reduce the liability of splitting off the edge of the coal supporting the timber. On the other side a short timber or leg is stood on the coal.

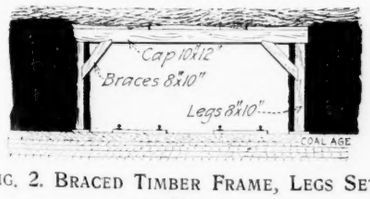


FIG. 2. BRACED TIMBER FRAME, LEGS SET IN COAL

Fig. 2 shows a method of using two legs and a cap or collar, and two braces of the same sized timber notched into the cap and legs as shown. This arrangement lessens the span and strengthens the collar. In both of these sketches the posts are cut into the coal on each side, and set back far enough so that a runaway car, or cars that become derailed will not knock the timbers out. The coal is cut just wide enough to admit the timber legs.

FIG. 3. CROSSBAR SUPPORTED BY HITCHES IN COAL

Fig. 3 shows a method where the crossbar only is used. One end is slipped into a slot cut in the coal, the other end being swung in sideways, and the bar tightly wedged against the roof and the sides. Both ends of the bar rest on a short plank and wedges to give a good bearing on the coal. This is an economical and effective method where the coal is hard and will not split or crack off.

The timber frames can be set about 3 ft. apart, and lagged on top with 2-in. plank.

Fig. 4 shows a method of making a crossbar out of two steel rails, bolted together, with a wooden chock or filler between them. The ends of this bar are supported by two wooden legs. The sketch shows the general arrangement at one end. This bar is simple, easily constructed and will sustain an enormous weight and

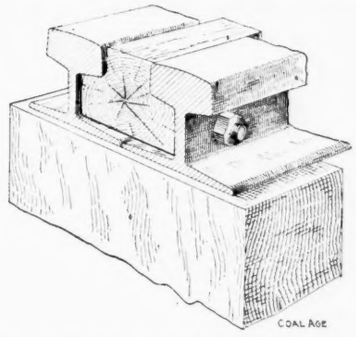


FIG. 4. CROSSBAR OF TWO STEEL RAILS

last a long time. The chocks do not reach the entire length of the rails; they are only about a foot long and placed where the bolts go through. Plank lagging can be used above the bars as with the other timber sets; or small iron rails, 16 lb. per yd., could be used, providing the roof was not too frail, requiring the lagging to be set skin to skin. This method is probably cheaper than the regular steel I-beams often used for mine timbering.

Fig. 5 shows a concrete arch with more than one radius. This is probably the most expensive first-cost method of supporting the roof over a sidetrack; but where the mine atmosphere has a corrosive effect on steel and rots wood, and where permanency and security are the chief factors to be considered, it is the best way to secure the siding or parting. This is especially true in shaft bottoms and landings. Where the weight to be sustained is great, and the excavation limited, the concrete can be reinforced with iron or steel to strengthen it.

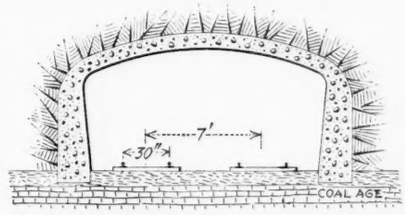


FIG. 5. CONCRETE ARCH OVER ROADWAY

Not knowing the track gage, or the height of the seam, I have given no figures beyond stating the usual sizes of timbers used for mine partings in the bituminous regions of Pennsylvania. In estimating the cost of the job, it is necessary to consider the available supply of steel timbers, and of wooden timbers. The costs will probably be equal, in a territory where timber is scarce.

Johnstown, Penn. R. Z. VIRGIN.

The Utilization of Low-Grade Fuels

I was much interested in the Foreword, in COAL AGE, April 6, which referred to the possibilities of the gas producer as an economizer of fuel for power purposes. The article draws attention, in a brief manner, to the fact that the gas producer has made it possible to use fuel that cannot be employed under a boiler because of its low calorific power, large ash content, or other cause that would make it an expensive fuel for this purpose. The statement is made that one ton of coal will turn more wheels operating through a producer and gas engine than two and one-half tons of the same coal burned under a boiler in the usual manner. This is an encouraging statement.

As master mechanic for the Cannel Coal Company of this city I have been studying the development of the gas producer, for some time. In preparing our

product for market we make one grade of coal (crushed-bone coal) for which there is little demand at the present time. There is a chance to sell electricity near here, for irrigation purposes; and we have thought, for some time, that this low-grade fuel, for which there is a limited market for power purposes, could be utilized through a gas producer and gas engine to furnish the power for an electric plant. I think such a gas producer and gas-engine-power station would be much better than a steam-power plant, in the economy of its operation. The article to which I have referred states that no coal is too poor for producer-gas purposes, and that coal containing even as high as 70 per cent. of ash has been used in this manner.

We have corresponded with a number of gas-producer manufacturers, but have found none who are willing to make any guarantee that this fuel could be used. If the statements to which we have referred are true, and we believe they are, we cannot understand why gas-producer companies should hesitate to assure us that their producer will work with this grade of coal.

The coal we mine is a semi-bituminous coal, called here "cannel coal." It gives on test about 15,000 B.T.U. The coal is very high in volatile matter, but has a large ash content. It is a long-flaming coal. The crushed-bone coal to which I have referred is what might be called a byproduct, in the preparation of our coal for market. I believe tests of this crushed-bone coal have shown about 8,000 B.T.U., with, of course, a somewhat larger percentage of ash than the regular coal.

I have suggested that our company should ship a car load of this crushed coal to some manufacturer of a good type of gas producer and have them try the same to ascertain the result. I would be glad to learn the name and address of such a manufacturer of gas producers, who would be willing to make such a test. I believe there is no fear but that the test would be successful.

W. F. SHUTT,
Master Mechanic,
Cannel Coal Company.

Darwin, Webb County, Tex.

[It is possible there is a large amount of impurity in the crushed-bone coal to which our correspondent has referred. If this impurity is of a nature or in such quantity as to obstruct the grate and reduce to a large extent the temperature of the combustion in the gas producer it might be impossible to use this coal for the purpose mentioned. As cannel coal is one of the best gas producing coals, it is very possible that even this low-grade byproduct could be used in a gas producer; but it might require some previous treatment in order to separate a portion of the impurities. It might be necessary to wash the product before using the same in a gas producer. We would suggest that an analysis of the crushed-bone-coal product should be made, as this would greatly assist in solving the problem. It is a good proposition and should develop some valuable ideas in regard to the utilizing of low-grade fuels.

COAL AGE will be glad to hear further from those who have had experience in this direction.—EDITOR.]

Treatment of Boiler Water

There is only one sure way of determining the proper treatment for boiler water, and that is to have it thoroughly and carefully analyzed. Then if there are properties in it which will cause either pitting, scales, or other boiler troubles, have chemists who make a study of this business prepare a compound or treatment specifically for this kind of water.

There are a great number of methods for treating boiler water, some of which are highly advertised. Many claims and counter claims are made, and experimenting indiscriminately with different methods is apt to discourage one from using any.

In time we will probably reach a stage of industrial development where practically all of the water used for steam will be analyzed and treated, if necessary, before it is used. Even the surface waters carry impurities that may produce scale or pitting, and it is so common among the miners to get water that is injurious that it is not safe to run a boiler any great length of time without carefully examining it. The better plan is to analyze the water and know before you start.

INJURIOUS IMPURITIES

Sometimes water strong in sulphuric acid derived from iron pyrites, or arsenical iron pyrites, will cause dangerous pitting of boiler tubes in only a few moments. This is a difficult water to treat.

The most common trouble with water that is seemingly practically pure is its leaving behind a sediment of lime or silicate, or a mixture of lime and clay that has been held in solution. This is quite common even in apparently pure surface water and it is this that forms what is termed scale in the boiler. Scale is not as bad as acids that will eat the metal of the shells and tubes. If neglected, of course, even scale proves dangerous in the end, but it is comparatively easy to clean out and remove.

The safe and sure plan is to send samples of the boiler water to chemists who make a specialty of boiler compounds; have it analyzed, and treatment prescribed according to its needs.

ENGINEER.

New York City.

The Fireboss Question

I have been much interested in the discussion that has been going on for some time, in COAL AGE, regarding the fireboss question. I am, at the present time, employed as a fireboss in western Pennsylvania. From my own experience I can indorse much of what has been said in regard to the general treatment of the fireboss. Whenever there comes an idle day and the mine foreman is aware of it in time to stop the fireboss from making his rounds or morning inspection, he is there at the mine entrance to stop them from going in or sends word and they are sent home after having risen at 2 o'clock in the morning and prepared themselves for the work and traveled sometimes a long distance to reach the mine in time.

The mines here mostly ship by river. When the river was frozen over last winter and the mine was idle, the firebosses were laid off or allowed the choice of working every other day, at a wage of $2.75 per day, which was 52c. less than their regular wage.

To show the difference between the treatment received by the firebosses and that received by other men in the mine, I would say it was a usual thing for the mine foreman to allow all the roadmen and their helpers and the day laborers to work every idle day. During last winter, when the firebosses worked every other day, these men worked every day.

It has been truly stated that during a period of idleness the fireboss should be the last man laid off, but during the idle period last winter, in our mines, the boss-driver and motormen got steady work; and one of these motormen was a new man, only recently hired since the mine had closed down on account of the freezing over of the river. All of the firebosses had been in the employ of the company a longer time than this man.

CHARTER MEMBER.

Western Pennsylvania.

A Flushing Problem in the West

When constructing the new Federal Building at Rock Springs, Wyo., the engineers were confronted with the problem of filling in the old workings of the Union Pacific No. 1 Mine which were directly below the site of the building.

To attempt to haul material for filling the workings through the old openings would have been a laborious and expensive proposition. In order to save time, the government engineers are drilling a series of churn-drill holes from the surface and the material for filling the old workings will be spouted down these drill holes, making a perfectly solid foundation for the building.

BENEDICT SHUBART.

Denver, Colo.

Examination Questions

Selected from State Examinations, or Suggested by Correspondents

Bituminous Mine Foremen's Examinations in Pennsylvania, April 9-11, 1912

Selected, Second-Grade Questions

Duties of Mine Foreman

Ques.—What are the duties of a mine foreman relative to his daily visit to each working place; what should he observe and what instructions give to the workmen?

Ans.—The mine foreman or one of his assistants must visit every working at least once each day while the men are at work. He must observe closely the condition of each place with respect to the health and safety of the men employed therein. He must see that the place is properly ventilated, drained and timbered; the coal properly mined and loaded, and proper breakthroughs made in the pillars. He must instruct each miner how to timber his place, mine his coal setting sprags not more than 7 ft. apart, and direct at what time blasting may be done. He must observe that sufficient timber and cap pieces are on hand, and that the fireboss has left his mark in the place, indicating that he has made his examination as required by law.

Ventilation, Water Gage in Two Airways

Ques.—If a water gage of 2 in. produces a velocity of 500 ft. per min. in an air course 4000 ft. long, what water gage will be required to produce a velocity of 800 ft. per min. in this air course, when its length has been extended to 8000 ft.?

Ans.—For the same cross-section (area and perimeter) of airway, the water gage varies as the length of the airway and the square of the velocity of the current. In other words, the water-gage ratio is then equal to the length ratio times the square of the velocity ratio. In this case, calling the required water gage x,

$$\frac{x}{2} = \frac{8000}{4000}\left(\frac{800}{500}\right)^2 = 2\left(\frac{8}{5}\right)^2$$

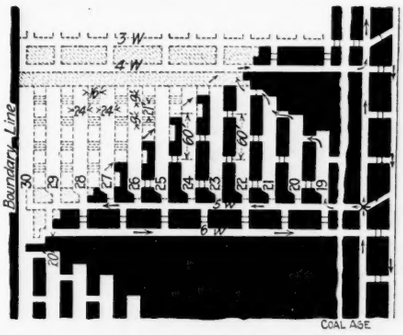
$$x = \frac{2 \times 2 \times 64}{25} = 10.24 \text{ in.}$$

Drawing Pillars by Machines

Ques.—What method is best adapted to extracting pillars, in the mine, by mining machines, under ordinary conditions of roof and floor?

Ans.—The use of mining machines in drawing pillars requires experience and care. Few systems of mining will present conditions that will allow the machine to work with safety on the end of the pillar. With proper care, however, in the laying out and the prosecution of the work, the pillar coal will be sufficiently strong, under ordinary conditions of roof and floor, to enable the machine to undercut the rib of the pillar, back, say 3 yd. from the loose end.

A cut 7 yd. wide can generally be put in on the rib and the pillar cut through in this manner. The stub pillar 3 yd. thick is then mined out with the pick after setting the necessary timbers to protect the opening while the work is being done. The manner of crosscutting the pillars is shown in the accompanying figure, rib cuts being started in rooms



Showing Method of Drawing Pillars by Machines

24-27. Each 7-yd. rib cut is thus made with the machine, starting 3 yd. back from the loose end, and the pillar again cut through as before. Timbers are stood in this cut and the 3-yd. stub mined out by pick. This operation is continued till the entire pillar is taken out back to the entry stump

It is important, for success in drawing back pillars, especially when machines are to be used for that purpose, to lay out the work systematically and advance the rooms regularly with breakthroughs at a fixed distance apart. These breakthroughs should not be opposite to each other, but staggered, as shown in the figure. The line of pillar work must be kept, as nearly as possible, a uniformly straight line so that there will be a corresponding uniform line of fracture in the roof and none of the pillars will be unduly weighted, which would crush the coal.

In the accompanying figure the butt entries are driven to the boundary and the inside rooms turned first. The entire work is regulated so that the line of pillar work is continuous across the head of the butt entries. In the present case, the main-entry pillars are 10 yd. wide, the butt-entry pillars 8 yd. and room pillars 16 ft. All entries are driven 10 ft. wide; rooms are turned 8 ft. wide for 4 yd. and then widened out, on the inby side, at an angle of 45°, to a width of 8 yd. This makes the rooms 40-ft. centers; they are driven up 60 yd., leaving a chain pillar 20 ft. wide to protect the upper air course. The butt-entry pillars, in each case, are drawn with the chain pillar below them at the time of drawing the room pillars on the next lower butts.

Pressure on Mine Dam

Ques.—A dam in an entry supports a vertical head of water of 80 ft. The wetted area of the dam is 70 sq. ft.; find the total pressure, in short tons, on the dam.

Ans.—Assuming the wetted area is a rectangle 10 ft. wide and 7 ft. high, the center of pressure is one-half the height or 3.5 ft. above the floor. Then, if the water level is 80 ft. above the floor the effective head against the dam is $80 - 3.5 = 76.5$ ft. and the pressure due to this head is

$$62.5 \times 76.5 = 4781.25 \text{ lb. per sq.ft.}$$

The total pressure on the dam is then

$$\frac{70 \times 4781.25}{2000} = 167.34 + \textit{short tons}$$

Ventilation, Height of Motive Column

Ques.—What would be the height of motive column, for upcast and for downcast air, respectively, where the depth of each shaft is 300 ft., and the temperature of the downcast shaft 32° F. and that of the upcast 48° F.?

Ans.—The heights of motive column, in terms of downcast and upcast air are, respectively,

Downcast air,

$$M = 300 \times \frac{48 - 32}{460 + 48} = \frac{300 \times 16}{508}$$

$$= 9.44 + ft$$

Upcast air,

$$M = 300 \times \frac{48 - 32}{460 + 32} = \frac{300 \times 16}{492}$$

$$= 9.75 + ft.$$

The upcast air being the lighter gives a longer motive column for the same pressure.

Sociological Department

For the Betterment of Living Conditions in Mining Communities

Emergency Car of Colorado Fuel & Iron Co.

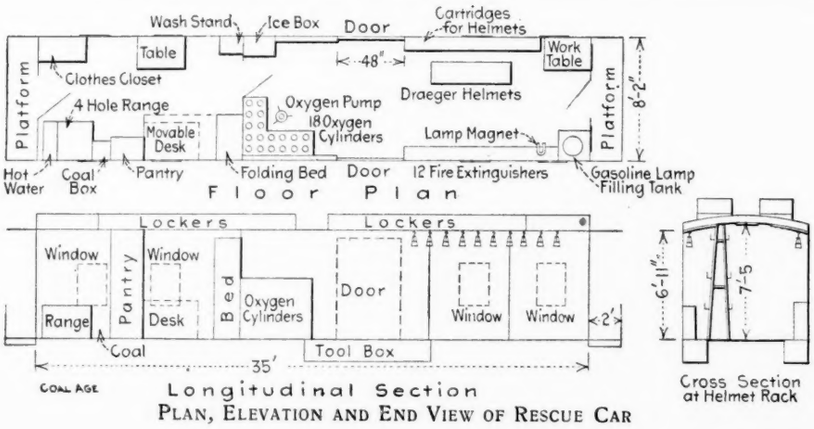
SPECIAL CORRESPONDENCE

The emergency car of the Colorado Fuel & Iron Co. has equipment features of more than ordinary interest. It is intended to supplement the rescue car proper, which carries the regular rescue equipment.

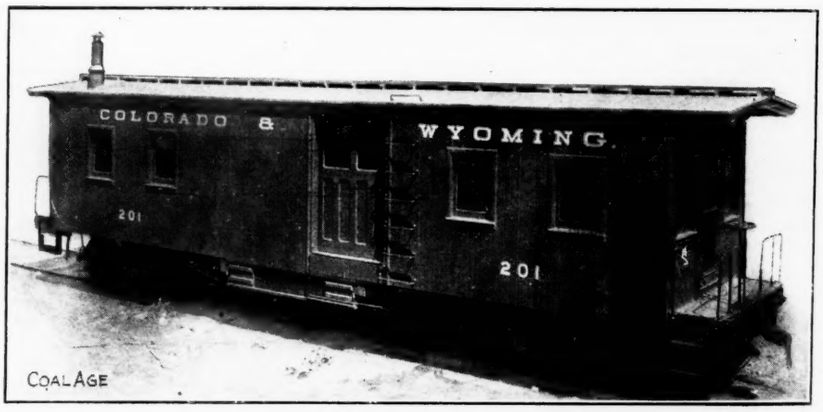
It is a standard box car, fully equipped for train service. It carries a 5-ft. disk fan, manufactured by S. B. Stine, of Osceola Mills, Penn. This fan has a sectional base with two bearings bolted together, which support the fan independently. At one end of the fan is a flexible coupling for attachment to any one of three motors. A base is carried in the car to support any one of the motors when in use. It is designed and built of sufficient strength and size to accommodate the largest motor, and is provided with the necessary liners, which match the bolt holes in the bases and bring the motors up to the correct height for alignment with the fan. These two parts, the fan base and motor base, when bolted together, complete a direct-connected fan unit of substantial construction.

MOTORS FOR ALL KINDS OF CURRENT

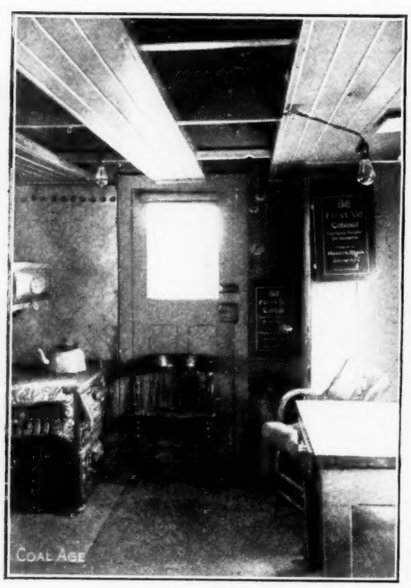
The different mines use current of different voltages. Moreover, at some direct current is used, and at others, alter-



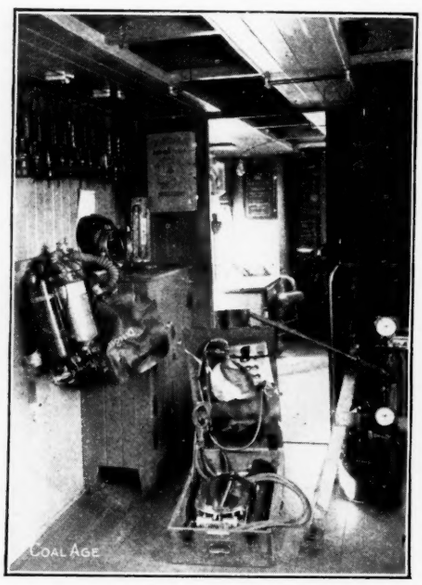
PLAN, ELEVATION AND END VIEW OF RESCUE CAR



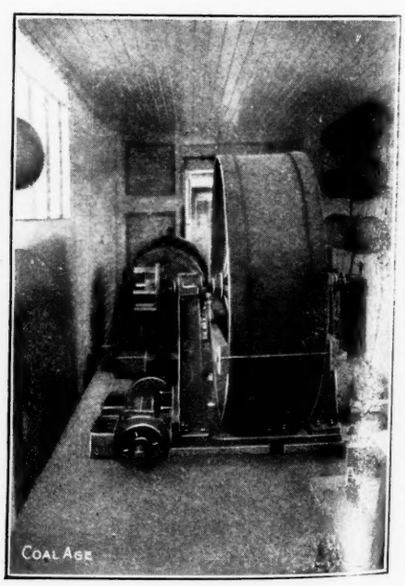
RESCUE CAR OF COLORADO FUEL & IRON CO.



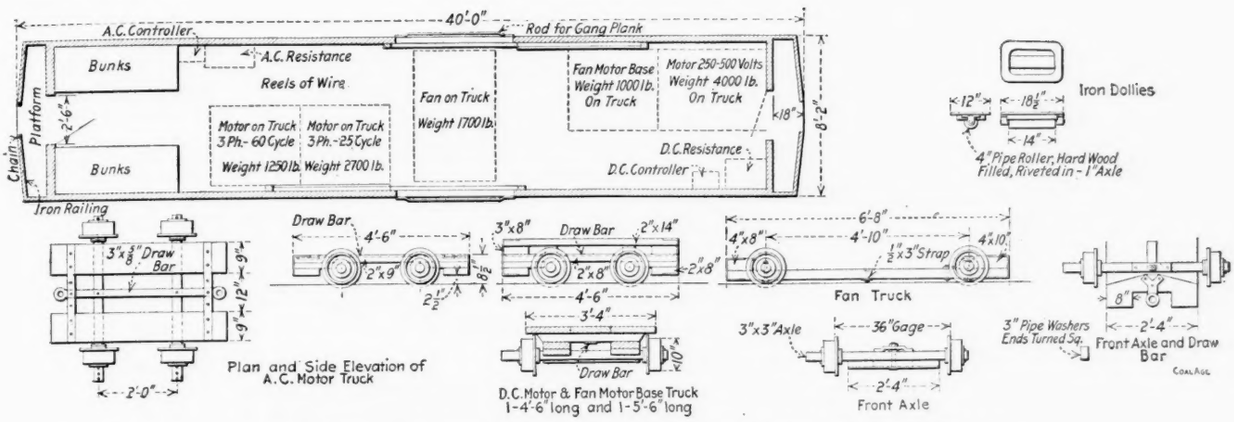
KITCHEN AND DINING ROOM IN REAR OF RESCUE CAR



OXYGEN PUMP AND CYLINDERS, PULMOTORS AND ICE CHEST



THE 5-FT. STINE FAN WITH FLEXIBLE COUPLING ON TRUCK



PLAN OF COLORADO FUEL & IRON CO. EMERGENCY CAR AND DETAILS OF TRUCKS

END OF RESCUE CAR, SHOWING HELMETS, OXYGEN CARTRIDGES, GASOLINE TANK AND LAMPS

These motors were furnished by the Allis-Chalmers Co. To facilitate transportation of the fan, the three motors and the adjustable motor base, each piece is equipped with specially designed trucks, or dollies. These are constructed to fit mine tracks, gaging 36, 38 and 40 in. On the car are also carried 2000 ft. of No. 4 wire, inclosed in a duplex rubber-covered cable, wound on a reel; also two 4-ton jacks and ropes, blocks, chains, and gangplanks. A supply of fireproof brattice cloth is set in racks on the sides of the car.

THE HELMET CAR

These supplies are supplemented by those carried on the helmet car, and it is the intention to move the cars together to the seat of any disaster. On the helmet or rescue car is carried a full supply of shovels, picks, axes, saws, hammers, bars, sledges, pipe wrenches, dies, pipe

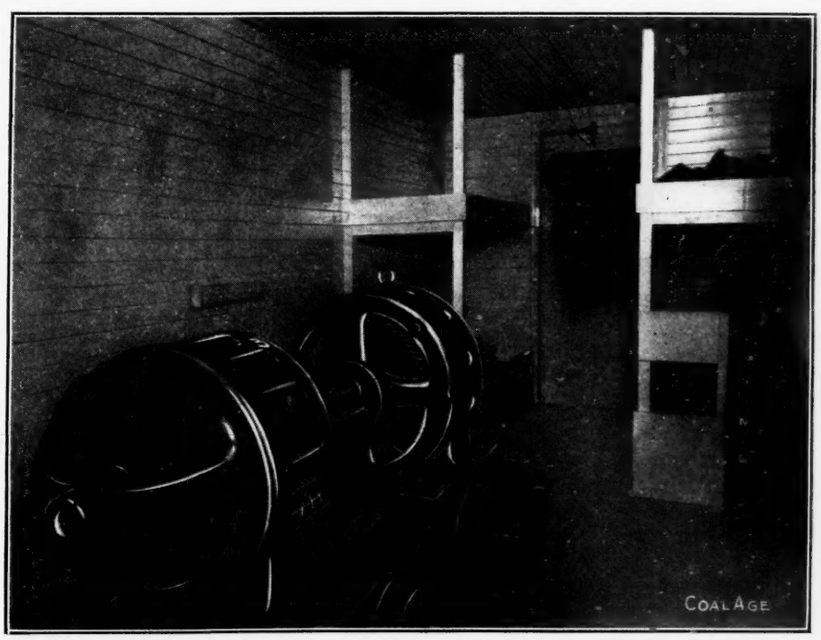
nating. To fit the different conditions, the Fuel Co. has installed three motors, suitable for every type of current supplied. The motors will operate the fan at any required speed, from 150 r.p.m. to 600 r.p.m. They are equipped with the necessary controlling apparatus to provide for the above range of speed. Each motor is fitted with its own corresponding half of flexible coupling, so that it is not necessary to change couplings when motors are changed.

The following is a description of the three motors:

One 20-hp. direct-current motor of the semi-inclosed interpole type, using from 250 to 500 volts, and running at 550 revolutions per minute.

One 20-hp., 25 cycle, 3-phase alternating-current motor of the semi-inclosed, wound-rotor induction type, using 440 volts and running at 480 revolutions per minute.

One 20-hp., 60-cycle, 3-phase, alternating-current motor of the semi-inclosed, wound-rotor induction type, using 440 volts and running at 575 revolutions per minute.



TWO ALTERNATING-CURRENT MOTORS ON ADJUSTABLE TRUCKS AND RHEOSTAT WITH BUNKS IN REAR

fittings, nails, rubber gloves, disinfectants, stretchers, fire extinguishers, 2000 ft. of 2-in. fire hose, cooking utensils and tents. Eight Draeger helmets, two pulmotors, a large supply of potash cartridges and oxygen, safety lamps, gasoline, complete first-aid equipment, flashlights and lanterns are also provided.

Telephones for Rescue Work

Another part of the equipment consists of eight portable telephones, equipped with one mile of twin conductor cable, made in accordance with the general specifications No. 548, of the U. S. Army, as follows: Each conductor is made up of seven wires of diameter 0.010 in., the center wire being of copper and surrounded by six steel wires, each conductor being insulated with $^1/_{64}$-in., 30 per cent. rubber-compound braided conductor, laid parallel and covered with waterproof braid. The telephones are for use in rescue work and will make it possible for the rescue party to be in communication with the outside. A full set of blueprints of all the mines is kept on file in the helmet car. It is also provided with the tin pocket splints invented by W. V. Gage and described in our issue of Mar. 30.

The emergency car is worthy of more general adoption. The Consolidation Coal Co., in the Fairmont district, has a fan placed in a car, ready for transportation when needed, but the Colorado Fuel & Iron Co.'s outfit is more elaborate and more flexible and should do good work, if the company should be unfortunate enough at any time to have to make use of it.

When Welfare Work Fails

By Charles L. Fay*

There is welfare work and welfare work. There is the sort which is the result of sudden impulse, often requiring large financial outlay, a "big" scheme which looks well in print and then, like the beautiful sky-rocket having blazed forth its glory for the moment falls somewhere in the outer darkness. It is all over, another failure and one more well meaning enthusiast, its promoter, is turned into a pessimist.

This man who once felt the great inner joy of an endeavoring to do something for others less fortunate than himself, his own employees perhaps, now considers the rank and file of men ungrateful, without desire for self-improvement and utterly unworthy of further serious thought. I have heard men with similar experiences to that mentioned, say, after failing to thrust a pet plan upon the masses: "The more you do for people the less they respect you. I thought differently, I find I was a fool. I was deluded by a fancy."

*Mining secretary, Pennsylvania State Y. M. C. A.

No Work Should Be Spasmodic

It never occurs to that man that *he* was at fault. He fails to recall that he was guided by a *sudden impulse* which had no basis other than the honest desire of a naturally generous and sympathetic nature. The man was all right and the sudden impulse was good but something was needed to control and guide it. That man should have remembered first of all that men and boys, whether laborers, mechanics, or what not, *think, and they think in the sphere in which they live.*

They respond with sincerity to a real and practical effort in their behalf, but they rebel and turn away from the superficial scheme. No man can lift and hold another man's life to a higher plane than he himself lives upon. For motive is the real power whether that motive be right or wrong.

The Bertillon Mark in Welfare Work

There have been instances where a man with humane desires but still dominated by a selfish motive, has projected a beneficent enterprise in an endeavor to develop employees or others to an unselfish plane of living and of conduct. The plan, of itself good, has failed to gain response from those it was intended to help and another pessimist results.

This man hides from his own consciousness a knowledge of his ulterior motive, boasts of his former willingness and desire to help other men and heaps invective upon the ungrateful (?) masses. The man of the "rank and file" felt instinctively the selfish motive lying far back in the recesses of that life which laid a bogus claim to a desire to "uplift him," and his manhood, latent and corroded, perhaps, rose in an unexpressed agony and resented the proffered aid. Had purity of aim graced an honest motive, that workman's manhood would have gradually risen in its majesty to the higher plane to greet its helper.

Strong impulse to do good, honest desire to better the conditions of men, pure motives in the enterprise on hand will always be backed by a careful study of conditions surrounding those to be benefited, also with a delicacy of perception and treatment which recognizes men as men.

The plan of helpfulness, thus born, whatever it may be, playgrounds, reading clubs, societies of one sort and another, will be so arranged that the genius of those gaining the benefits will be required and have ample opportunity to operate in maintaining and developing whatever is undertaken. So that, out of their lives may come a fruitage from the growth developing within, started and nurtured by the kindly spirit and honest motive of the benefactor.

A life is an outward growth from within; it cannot be lined with a tee-square and developed in a blueprint room. Qualities cannot be tacked to the character as an "addition" or a "cupola" is added to a house. Like a leaf or a flower it may be checked or controlled but its growth must proceed from the vital processes within.

Mine Rescue and First Aid Contest, Colorado School of Mines

Special Correspondence

On the last day of March, a most interesting demonstration of the Draeger Oxygen Helmet in mine-rescue work, and a first-aid-to-the-injured contest, was held by the students of the State School of Mines at Golden, Colo., under Prof. J. C. Roberts, of the U. S. Bureau of Mines, who had Rescue Car No. 2 there for ten days while he, with the crew of the car, were giving instructions in the above work to about 80 students from the senior and junior classes.

In the first-aid contest, ten teams, consisting of a captain, four assistants and a patient, competed for a silver loving cup presented by Dr. Victor Alderson, head of the school. The judges were Captain George C. Osburne and two other U. S. Army officers.

The demonstration of life saving in mine fires or explosions, was given at the School of Mines' tunnel. Dense fumes poured from the portal; students wearing the oxygen helmets went in and rescued the victims, and then gave them first-aid treatment outside the tunnel.

For saving the lives of the workers in coal and metal mines such tuition is invaluable, and this fact is now recognized by mine operators all over the country, who are giving their employees free instruction in this great work. Professor Roberts was assisted by Professors Schneider and Allen.

Tree Culture

Without doubt the public schools are destined eventually to promote the desire for beauty which will make mine hamlets places of scenic charm and order. It will be objected that children must be reckoned with in any plan of beauty culture. Children are fond of destroying trees, solely because this destruction forms an occupation for their waste activities, but it will be observed that they take up fiercely a defense of anything those same activities have created or fostered. Consequently if children be induced to plant trees they will be devoted in their defense of the beauty they have labored to create and if their interest is enlisted children are natural conservationists, as active in protection as they are otherwise prolific in devastation.

Coal and Coke News

From Our Own Representatives in Various Important Mining Centers

Washington, D. C.

A body of several hundred delegates, representing commercial organizations, and among them men from various coal mining bodies, notably the National Federation of Coal operators, met in Washington, Apr. 22-23, upon the invitation of the Secretary of Commerce and Labor, for the purpose of discussing the advisability of forming a national chamber of commerce which would represent the commercial bodies of the country and would give expression to their views and wishes in regard to matters affecting federal policy.

It was decided to form an organization of the kind and to ask for a national charter, to be granted by Congress, with the idea of giving the organization a certain amount of governmental recognition and standing which, it was supposed, could not otherwise be had. Four plans for organization were more or less urgently placed before the convention and the scheme finally recommended was based as far as possible upon the ideas embodied in these plans.

Secretary Nagel in his opening address indicated the necessity for such a body as this for the purpose of concentrating public opinion upon national questions, and enumerated some of the principal issues now pending before Congress as being among those with which it should deal. Harry A. Wheeler, of Chicago, chairman of the convention, stated his opinion that an important function of the enterprise should be to ascertain facts by investigation, and then to attempt to secure national action based upon the conditions thereby revealed.

The new organization will be national in scope and based on existing trade organizations, chambers of commerce, etc., each being entitled to a delegate if its membership numbers 50, with one additional delegate for every additional 100 members, the total number of delegates from any one organization not to exceed ten.

Coal Car Discrimination Cases

The Interstate Commerce Commission has made a series of important awards in the actions brought by the Hillsdale Coke Co., Jacoby & Co., the Clarke Bros. Co., and the Bulah Coal Co. against the Pennsylvania R.R., all of which involve the question of reparation for losses due to discrimination in the distribution of railroad coal cars.

Damages were awarded to the several coal companies and in explanation of its assumption of authority in this matter, the Commission states that "there is a conflict of view as between the Commission and the very court to which these complainants, if refused any relief here, would doubtless have to resort to secure a judgment for the damages here claimed to have been sustained. In order, therefore, to prevent a failure of justice in these cases, as well as to create an opportunity to secure a final ruling by the courts as to what should be our course of action in the future in such cases, we concluded to proceed with these claims; and having found that undue discriminations had been practiced by the defendant against the complainants, we ordered a reargument on the question of the amount of damages respectively sustained by them by reason thereof."

In closing the discussion, the Commission says:

> Many theories as to the elements that should be considered in estimating damages in a case of this kind were advanced by each side. It is said by the complainants that their damages should be estimated on the basis of a supply of coal cars according to the physical capacity of their mines, or at least on the basis of their rated capacity. We have dealt with the claims only on the basis of the fair proportion of the available equipment that each claimant was entitled to receive in view of what we here find would have been a proper rating for each operation. According to the argument and brief on behalf of the defendant there is no sound theory upon which the damages of the complainants may be calculated. The defendant contends in all these cases that the coal which the complainants were unable to mine because of their failure to obtain their fair share of cars still remained in the ground, and that the extent of the damage really suffered cannot, therefore, be ascertained without proof, showing that the coal when subsequently mined was sold at a less profit than might have been realized during the period of the action. We are not prepared to enter upon a discussion of that question. Such claims are clearly justifiable, and we know of no better guide or basis for our action than the rule followed by the courts in similar cases.

Alabama

Odenville—The miners employed by the Seaboard Coal & Coke Co. went out on strike, Apr. 15, as a result of a dispute in regard to the method of payment. The men wanted payment on a yardage basis and the company proposed to maintain the present system.

Birmingham—According to official figures recently received by Chief Mine Inspector Nesbitt, Alabama jumped, last year, from sixth place to fifth place among the coal-producing states, despite the fact that the output for 1911 showed a reduction of over a million tons compared with 1910.

Colorado

Florence—The Colorado Fuel & Iron Co. is preparing to sink a new shaft about 1½ miles south of Rockvale on the Radiant branch of the Santa Fé. This will tap the most extensive coal area in the Fremont County field. At present this territory is being worked by the Canfield company, at Coal Creek.

Charles Cowan, formerly one of the county's large coal operators, has filed articles incorporating the Farmers' Progressive Coal Co., with a capital stock of $50,000 to operate coal mines in Delta County. Several years ago Mr. Cowan purchased a large tract of coal land near Paonia, which has been found to contain six seams of domestic and steam coal. The mine is situated on the mountain side overlooking the town of Paonia and a tramway, which is now being constructed to convey the coal from the mine to the foot of the hill, will land the coal within a mile and a half of the town.

Denver—The government brought suit some time ago to recover 4000 acres of coal land in Routt County, which it alleged had been obtained by fraudulent means through dummy entrymen. At the conclusion of the hearing of this case recently, Federal Judge Trieber advised the defendants that he would sustain the government, at least in regard to its claim to 1640 acres of the land.

Illinois

Murphysboro—At Bush, a mining village of 600 inhabitants, in Williamson County, 18 persons were killed by the storm which swept this section, Apr. 20. The town was laid in ruins, the property of the Western Coal & Mining Co., the post office, a store, two hotels and 40 dwellings were demolished.

Belleville—A jury in the circuit court recently awarded the Mulberry Hill Coal

Co. a verdict for $10,000, against the Illinois Central R.R. Co. as damages for failure to furnish the plaintiffs with coal cars for the transportation of coal during a period of 99 days. This is the first case tried in Illinois under the new law, and this is the third time the case has been tried. The railroad company will appeal to the supreme court.

Springfield—The Sangamon Loan & Trust Co. has been appointed receiver for the Barclay mine and will probably arrange to lease or operate the property while acting in this capacity

Condemnation proceedings in connection with the right-of-way for the extension of the Chicago & Northwestern R.R. to the coal fields of central Illinois are rapidly being wound up in Tazewell and Sangamon Counties and it is expected to have deeds to all the property desired, by the first part of May. The road passes through the counties of Tazewell, Mason, Menard, Sangamon and Macoupin. The expenses of securing the right-of-way through Sangamon County will amount to $300,000, while the aggregate for the other counties will reach $500,000.

Troy—It is reported that the well known Bennett coal mine, located about two miles west of Lebanon, will be abandoned in the near future. Practically all the available coal has been taken out and the underground haul is now too long to operate the mine profitably. The Bennett mine is one of the oldest in this section, having been operated for the past 40 years.

Indiana

Indianapolis—With the formal signing of the Cleveland wage contract here Apr. 25, by representatives of the United Mine Workers and the bituminous coal-mine owners, peace was established in the central competitive field, so far as wages are concerned, for the next two years. The field comprises Indiana, Illinois, Ohio and western Pennsylvania, and the agreement probably will be the basis for contracts in the North and Southwestern coal fields.

Terre Haute—The convention of Indiana United Mine Workers adjourned Apr. 19 for 10 days, to allow time for the signing of the interstate agreement. Linton was chosen as the place for holding the next biennial convention. The convention voted down the plan for mutual accident insurance, with the operators paying nine-tenths of the assessment, which would raise $235,000 a year, because the delegates want a state law which will establish compulsory liability for the operator.

Kansas

Pittsburg—Grievances that have been in existence for the past two months at mine No. 17 of the Central Coal & Coke Co. were settled recently by Vice-President Variot and Assistant Commissioner George Richardson. It is said that the agreement is eminently satisfactory to both sides.

Kentucky

Madisonville—Six lives are believed to have been lost in the explosion, followed by a fire, in the Coil coal mine, near here, Sunday night, Apr. 21. The body of Joseph Hollowell, the mine foreman, was found Apr. 23, and also the bodies of three negro miners.

Hickman—Representatives of the owners of coal mines of western Kentucky and eastern Tennessee have been here the past week trying to get men who have been flooded out of their homes and work to go to the mines to work. They have met with no encouragement, however.

Pineville—The New Straight Creek Coal Co., a corporation composed of Winchester capitalists which was organized for the purpose of leasing and operating the mines of the Big Hill Coal Co., at Blanche, has surrendered its lease, after having operated the property for about nine months. The Big Hill Coal Co., the owners of the property, took charge the first of the month and are now operating.

Winchester—Work on the opening of a new $100,000 coal-mining plant in the northern edge of Perry County, on the new extension of the Lexington & Eastern R.R., will be begun at an early date, and the owners, who are Northern capitalists, are arranging for headquarters here.

Ashland—Owing to the increased coal tonnage over its lines, the Chesapeake & Ohio is reported to be considering double-tracking from Russell to Ashland, and improving its facilities at Russell.

Henderson—The engine and boiler room of the Keystone Mining & Manufacturing Co., at Henderson, was damaged by fire recently. The tipple was threatened by the blaze, which was kept under control, however.

A Chicago syndicate is reported to have acquired a considerable amount of coal lands along the Kentucky River, in Letcher County. It is on the right-of-way of the extension of the Lexington & Eastern Railroad.

Michigan

Saginaw—West side capitalists are back of a new coöperative coal-mining company which it is expected will be organized and incorporated in the near future. Twenty-five practical miners are wanted as stockholders. It is proposed to use the unworked part of the old Caledonia tract and add to it a large acreage. A shaft 900 ft. deep will be sunk. A vein 3 ft. 8 in. thick is to be found under this locality.

It is expected that all the men will be back at work in Michigan coal mines by the first of the month.

Ohio

Columbus—During a two-days' session, which adjourned at Columbus, Apr. 4, the executive board of the Ohio district, United Mine Workers, named the dates for holding a number of conferences between miners and operators in several of the sub-districts as follows: Massillon, May 1; Hocking Valley, May 6; Guernsey, May 9; eastern Ohio, May 15; Jackson, May 27. These meetings are for the purpose of perfecting the details of the Cleveland agreement. President John Moore will attend each of them and as soon as those named above have been held dates will be selected for holding similar conferences in the six other sub-districts in Ohio.

Bridgeport—Ten thousand miners in eastern Ohio resumed work Apr. 23, after being idle since the last day of March. The men were expected to resume work on the twenty-first, but for some reason they failed to get an official circular sent out last week, and refused to report. Miners at Plum Run, Bradley and Piney Fork, where rules which permitted pumpers and repair men to work pending scale conferences, were violated, are to be disciplined and many of the ringleaders will be expelled from the United Mine Workers.

Zanesville—The citizens of Winterset are greatly interested in rumors of the building of a new railroad running east and west through Guernsey County. It is said the new road will leave the Pan Handle at Coshocton, running east via Plainfield to Birds Run and Tyner, then passing through the coal fields of Harrison County and terminating at Jewett or Cadiz Junction. It is claimed that the new road will shorten the distance from Columbus to Pittsburg several miles and pass through one of the richest coal districts in the state. If the new railroad is built it is also rumored that new coal mines will be opened up.

Pennsylvania

BITUMINOUS

Pittsburg—An award of reparation against the Pennsylvania R.R. Co., aggregating in five cases, $129,722, was made, Apr. 24, by the Interstate Commerce Commission. The commission found that the railroad had been guilty of unlawful discrimination in the distribution of its coal-car equipment, by reason of which five complaining coal companies had been unable fairly to market their products. The commission established a new principle by awarding damages in these cases. Heretofore, such matters have been referred to the courts

The orders require the Pennsylvania to pay to the Hillsdale Coal & Coke Co., $27,193; to W. F. Jacoby & Co., $21,094; to Clark Brothers Coal Mining Co., $31,128; to the Bulah Coal Co., $31,716, and to James H. Minds, $18,592.

Efforts of socialists and those in sympathy with the Industrial Workers of the World to inject politics into the affairs of Pittsburg District No. 5, United Mine Workers, are said to have caused the present rupture in the ranks of the local district. An appeal, said to have the support of Michael Halapy, of Indianapolis, formerly of this city, to the national board, for a reëlection of officers of this district has been made. There is thought to be little chance, however, that the national council will grant the petition. Halapy was defeated for the presidency of the local district by Francis Feehan, of Pittsburg.

Thirty-five new men were placed at work, Apr. 23, in the mines of the Hicks Coal Co., of Brackenridge, in place of the miners who went on strike two weeks ago. The striking men contented themselves awaiting an adjustment of their difficulties. No disorder is expected.

Huntingdon—On application of the Broad Top Coal & Mineral Co., an injunction was issued, Apr. 22, by the Huntingdon County Court, enjoining certain members of the miners' union from interfering with the operation of the company's mines and trespassing on the company's property. The Broad Top company's mines have always been nonunion, and as a result of the recent organization of the miners, they have been closed down since Apr. 1.

ANTHRACITE

Scranton—The sub-committee of anthracite operators and miners in session at New York reached an agreement, Apr. 25, and the coal companies are preparing for a resumption of work by Monday, May 13. The agreement will undoubtedly be ratified by the general committee, which meets on May 2, and also by the miners convention, to be held later, although some little dissatisfaction is felt among the men in not having obtained a higher increase in wages. Briefly, the terms of the agreement reached by the subcommittee are as follows:

A 10 per cent. wage increase, with the abolition of the sliding scale. A four-year contract. The granting of colliery committees, working in conjunction with union officials to adjust grievances, with the conciliation board as a final arbiter. The signing of agreements by the union executive officers as representatives of the Anthracite Miners' organization. The maintaining of laborers' wages at rates fixed by the strike commission of 1902. The right to elect checkweighmen and docking bosses at the collieries. The maintenance of the strike commission clause to pay all miners uniform wages, according to the 1902 settlement. The determination, by committees of miners and officials at each colliery, of what wage rates prevailed at the collieries prior to the 1902 strike, which formed a basis of the settlement of that controversy. A standard wage rate for miners employed on "consideration work." This rate has not been announced, but it is supposed to be $3.50 a day.

Four men were buried recently under a fall of burning culm, at the bank of the Central colliery, of the Pennsylvania Coal Co., at Avoca. The material was being washed away and, becoming undermined at a point near where the men were working, a portion which was on fire gave way and slid down upon them. All were rescued alive, but three of the men died later from their burns. Five men were seriously burned in the same way at this place about a month ago.

Wilkes-Barre—The annual meeting of anthracite mine inspectors opened in Williamsport, Apr. 24. Twenty-one inspectors from all over the region were present. D. J. Roderick, of Hazleton, presided over the gathering, and Carbondale, Scranton, Old Forge, Pittston, Wilkes-Barre, Hazleton, Mahanoy City, Shenandoah, Centralia, Pottsville, Lansford, Mount Carmel, Shamokin, Lykens and Forest City were represented.

Hazleton—The Lehigh Valley Coal Co. is moving the offices of the Hazleton division to the tenth floor of the new Markle Building, and combining with them the offices formerly at Drifton. In this way Superintendent Davies will have all his forces under his immediate supervision.

Tennessee

Bristol—According to a rumor that is current in Bristol and Roanoke, the general offices of the Virginia Iron, Coal & Coke Co. are to be removed to Bristol. The report is unconfirmed, but it is believed to have good foundation.

Coal Creek—A strike has been called at the Cross Mountain coal mine, of the Knoxville Iron Co., at Briceville. Sixty to seventy-five miners are out, pending a settlement of the matter. The strikers demand a 10-per-cent. increase in the wage scale, a 9-hour day and a semi-monthly pay day instead of being paid off once a month, as heretofore. Inauguration of the strike was attended by no violence or demonstration of any character. President T. I. Stephenson, of the company, went to Briceville and was notified of the miners' demands. The company has made no public statement here as to what action it will take.

Washington

Tacoma—One miner was killed and seven were painfully but not seriously burned, as the result of an explosion of firedamp, Apr. 15, in the mines of the Pacific Coast Coal Co., at Burnett, a small coal-mining town 25 miles southeast of Tacoma. According to the superintendent, the explosion was caused either by the breaking of a miner's safety lamp or by the careless usage of one of the lamps.

West Virginia

Wheeling—A call was issued, Apr. 26, for a joint conference of the miners and operators of the Fifth Ohio subdistrict, which includes four counties in this state, to be held in Wheeling, May 15, to arrange the working scale for 17,000 miners. The operators asked to have the place of the meeting changed to Cleveland, Ohio, but the miners will not consent unless the operators agree to pay the extra cost of caring for the miners' delegates. The miners' annual convention opens here May 13.

Morgantown—Within a few days a new coal company will apply for a charter for the purpose of developing coal lands in Mineral County. Enough stock has been taken to buy 20,000 acres; at the present time 300 acres are owned by one of the men forming the new company. The capitalists composing the company are from Morgantown, Uniontown, Penn., and Baltimore.

Numerous mass meetings are being held by the miners, on strike in the Kanawha district. One at Smithers was attended by about 2000 men from the mines at Boomer, Harewood, Longacre, Cannelton, Carbondale and National.

The Mound Coal Co.'s mine, recently the scene of much rioting, followed by the arrest of a dozen strikers, resumed operation, Apr. 22, after a two weeks' suspension, and has continued to run with a gradually increasing force.

Charleston—Employees of two additional mines joined the strikers in the Kanawha field, Apr. 23—those at Peytona and Racine, along Coal River. About 300 men are employed there. The mines are nonunion.

Canada

Toronto—The commission appointed by the provincial government of Alberta to prepare amendments to the Coal Mine Act began its sittings recently in Calgary. John Sterling, provincial inspector of mines, has been appointed chairman. The government of Alberta proposes to establish several mining rescue stations at various points in the coal-producing areas. The first of these has been installed at Blairmore, where five men are now under training.

Japan

Tokio—Following an explosion of firedamp in the coal mine of the Hokkaido Coal Co. at Yubari, on the island of Yezo, Apr. 30, 283 miners were reported to have been entombed.

Personals

A. H. Storrs has been elected president of the Jed Coal & Coke Co., as successor to the late W. A. Lathrop.

J. F. Russell, sales manager for A. Simons & Son of Columbus, is confined in the Grant Hospital as the result of an accident.

Frank L. McCarty, formerly superintendent of the Union Pacific mines at Reliance, has been appointed superintendent of the Superior mines.

Carl Scholz, of Chicago, Ill., president of the Rock Island Coal Mining Co. and of the Coal Valley Mining Co., recently spent some little time in Birmingham, Ala., on business.

C. G. Weitzel, president of the New Pittsburg Coal Co., of Columbus, returned recently from Cleveland, where he went to investigate the outlook for the coming lake trade.

Edward N. Peterson, of Peoria, has been elected president of the newly organized Mid-Valley Coal Co., and William Noonan, of Tremont, has been elected vice-president.

Baird Snyder, Jr., formerly general superintendent of the Lehigh Coal & Navigation Co., Lansford, Penn., has opened offices in Pottsville, where he is established as a consulting engineer.

D. G. Thomas has been appointed superintendent of the Union Pacific mines at Rock Springs and Reliance. Mr. Thomas has been special inspector of the Union Pacific coal properties for the past two months.

H. H. Heiner, president of the Maynard Coal Co., which operates properties in the Pomeroy Bend field, Ohio, returned recently from a trip to the Pocahontas field, where he is interested as receiver for the Big Vein Pocahontas Coal Co.

William Leckie has resigned as manager for the Jed Coal & Coke Co., Jed, W. Va., and C. M. Kornuff has been elected as his successor. Mr. Leckie's resignation was tendered so that he can devote more of his time to other plants in which he is interested.

Edward H. Coxe, general superintendent of the coal mining department, Tennessee Coal, Iron & R. R. Co., who has tendered his resignation to take effect June 1, was recently presented with a handsome gold watch and fob by a party of his friends and business associates.

Lewis A. Riley has been elected president, *pro tem*, of the Lehigh Coal & Navigation Co., to fill the vacancy caused by the death of W. A. Lathrop. Mr. Riley was president for a short time prior to the election of Mr. Lathrop and has since been chairman of the executive committee.

Obituary

Harry R. Beeson, secretary-treasurer and sales manager of the New Pittsburg Coal Co., and one of the best known coal men in Ohio and adjoining states, died, Apr. 15, at his home in Columbus, after a three weeks' illness.

Mr. Beeson was born and reared in Pennsylvania. He was 45 years of age at the time of his death. Starting in as a clerk in the offices of the Hocking Valley R.R. Co., he later went with the Pullman company and subsequently became traveling auditor for the Emerson McMillan properties, widely scattered throughout the west. About 10 years ago he entered the employ of the New Pittsburg Coal Co. and rapidly rose to the position he occupied at the time of his death.

Construction News

Viper, Ky.—It is reported that the Kelly Coal Co. will build a coke plant.

Bastrop, Tex.—The Bastrop Coal Co. is sinking shaft No. 2 and will install additional machinery.

Phelan, Tex.—The Independence Mining Co. is sinking its No. 3 shaft and will install additional machinery.

Helena, Ala.—The Wadsworth Red Ash Coal Co., of Birmingham, contemplates developing coal mines near here.

Birmingham, Ala.—The Crescent Coal Co., B. F. Roden, president, contemplates opening a new mine, at Kimberly, at a cost of $100,000.

Florence, Colo.—The Colorado Fuel & Iron Co. has asked for bids for sinking and timbering a 400-ft. shaft about 1½ miles south of Rockvale, Fremont County.

Johnstown, Penn.—Announcement has been made that another mine will be opened at Foustwell by the Somerset & Cambria Coal Co. and a contract for a number of new houses will be awarded in the near future.

Pittsburg, Penn.—The board of directors of the Four States Coal & Coke Co. has recommended an increase of capital stock from $1,500,000 to $2,500,000 to provide for completing the equipment of Annabelle No. 2 mine and the development of another mine.

Hazard, Ky.—The Perry County Coal Co., capitalized at $400,000, will open and develop its property near Viper, Ky., including the Richmond-McIntire tract and adjoining lands. E. L. and A. G. Speaks have organized the Speaks Coal Co., to develop a leased mining property.

Hazleton, Penn.—The Dodson Coal Co. contemplates improvements at the Morea colliery which will involve machinery for handling mine cars to and from a dump supplying a gunboat hoist in the mines. Address inquiries to T. M. Dodson, vice-president, Morea Colliery, Penn.

Birmingham, Ala.—The Sloss-Sheffield Steel & Iron Co. will expend $50,000 for mine improvements, to include 400 hp. increase of boiler capacity and two air compressors at the Bessie coal mines and a 300- to 400-hp. boiler increase at the Flat Top coal mines, costing $15,000, and improvements at Sloss iron-ore mines costing $35,000.

Publications Received

THE COAL MINER. A STUDY OF THE STRUGGLE TO SECURE REGULATED WAGES IN THE HOCKING VALLEY. By Earl A. Saliers, Ph. D., Instructor in Economics in Lehigh University, South Bethlehem, Penn. Bethlehem Printing Co., 1912. 1¼x7¾ in. 65 pp., no illus. Cloth. $1.

In view of the sub-title of this book, it is not necessary to point out that the writer has taken almost without exception the standpoint of the miner. But we must concede he has shown a conservatism of statement and a dignity of language which will make the book acceptable reading to those who view the controversy from a different standpoint.

In the first chapter he discusses the "Pre-organization Period" when the Hocking Valley coal field was in its infancy. He details the disturbances which followed the unreadiness of the operator to recognize the inability of the Hocking Valley furnaces to cope with the competition of those in the Alabama fields. Realizing that the market was being destroyed by competition, they strove at first to lower wages but ultimately met the original wage by invading new markets. In the second chapter is discussed the "Period of Organization" and interesting but brief information is given of the earlier unions and of the formation of the United Mine Workers of America.

The third and last chapter discusses the evils of the "Truck System of Payment" and of delayed pay, and records the legislation, often ineffectual, by which it was sought to control and restrain these developments. The book can be read in one sitting and while unsensational, treats a mass of details in an interesting way. As the writer omits all statistics, one cannot form from the book itself an estimate of the truth of his conclusions. However, if the figures were obtained, it is probable that they would substantiate all that the author has stated.

Trade Catalogs

Helmick Foundry-Machine Co., Fairmont, W. Va. Booklet. Helmick Mine Cars. 15 pages, 3½x6 in., illustrated.

Ingersoll-Rand Co., 11 Broadway, New York. Bulletin. "Arc Valve" Tappet Rock Drills. 16 pages. 6x9 in., illustrated.

Chain Belt Co., Milwaukee, Wis. Monthly Bulletin. Concrete and Chain Belt Concrete Mixers. 8 pages, 6x9 in., illustrated.

Goulds Manufacturing Co., Seneca Falls, N. Y. Booklet. How and When Pumping Costs Can be Reduced. 16 pages, 6¾x8¼ in., illustrated.

Industrial

The H. Koppers Co., of Chicago, announces that it has succeeded to the business of H. Koppers, of Joliet, Ill., and will soon establish general offices at No. 5 Wabash Ave., Chicago. Mr. Louis Wilputte, formerly connected with the business of H. Koppers, is not connected with the new company.

Coal Trade Reviews

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The stocks accumulated in anticipation of a prolonged suspension at the mines are having a decidedly depressing effect on the trade, with the result that the market is dull and heavy. Prices have been easing off slowly but steadily for several weeks, and buyers are hesitating to enter the market until satisfied that the bottom has been reached. Supplies are so plentiful that some consumers are offering to dispose of their surpluses.

In the Eastern markets no effort is being made to obtain anything more than a normal price; that is, last year's quotations with the new wage scale added. Some companies are still delivering on contracts made at the high level prevailing through March, but this business will soon close. It is rumored at some points that the selling scale fixed by the Pittsburg companies is being severely cut. Mines in that district are only working about 50 per cent. capacity, most of the operators refusing to open up full blast until there is some pressure for coal. Supplies of anthracite are down to a low point, and a continuation of the suspension at the mines will soon result in an acute shortage in this branch.

Prices in Ohio and West Virginia are soft, except in the small sizes, which are in good demand. Most of the Ohio mines are now in operation, and a heavy lake trade is anticipated during the coming season. It is expected the April shipments to the coast from West Virginia will break all previous records, and while the market generally is not so active, the demand is still fairly strong.

The trade in the Middle West is nearly demoralized. There is an almost total absence of any buying movement, large supplies are still in evidence, and the operators are seeking an increase in prices to compensate for the increase in the mining scale. A large number of mines are opening up, and should the output be heavy, prices will probably drop to about the cost of production.

Boston, Mass.

Some inquiry for contract has developed lately in bituminous, but there is little interest in coal for current needs. Stocks accumulated during the "flurry" are surprisingly large, and together with mill suspensions here and there and an unusually heavy run of water for power makes the outlook rather dull. There appears to be a disposition on the part of the Pocahontas and New River interests to net more remunerative prices than obtained last year and with conditions here as they are that would certainly point to a slow druggy market through the spring and early summer.

In Georges Creek and the Pennsylvanias there is no material change. There is no longer an effort to get any but normal prices, that is, last year's level with the increased mining cost added. At that the movement is light into New England.

Marine freights are down to 70c., Hampton Roads to Boston, and in most cases tonnage goes begging. The release of certain anthracite transportation for soft coal has reduced the rates that previously held from Philadelphia.

Bituminous in transit all-rail has been practically cleared up. The resumption in the union districts means that buyers' wants can now be easily and promptly supplied.

The news of the compromise in anthracite has allayed any fear of a prolonged tie-up. With retail prices still where they were put to stop undue buying early in March, there is little coal going out to the consumer. One large retailer speaks of his delivery yard being turned into a horse show.

Quotations are as follows:

Clearfields, f.o.b. mines	$1.15@1.35
Clearfields, f.o.b. Philadelphia	2.40@2.60
Pocahontas, New River, f.o.b. Hampton Roads	2.75@2.80

New York

The New York market is dull and quiet. Prices have been steadily easing off for several weeks and are now at the lowest point reached since the panicky conditions in effect during the early part of the suspension. At no time has there been any acute shortage, although rumors to that effect resulted in a heavy buying movement on a number of occasions and caused prices to advance sharply. There are adequate supplies on hand now and the market is about normal.

The low-grade bituminous coals are being quoted down as low as $2.50 or $2.55 f.o.b., but there is not much offering at this price. The higher grades are nominally about $3 f.o.b., although there are few transactions being made. The movement is confined principally to shipments on contract, and there is little demand for spot coal. Mines shipping this market are working up to a good capacity, and large tonnages are coming in.

In anthracite the situation is not so easy. The effects of the long shutdown at the mines are being felt, and while the prospects of a settlement are now in sight, it will be some time before any shipments can be expected, and there is a noticeable uneasiness among consumers. A joint meeting of the operators' and miners' full committees takes place here, May 2, to consider the results of the agreement reached by the subcommittees. It is generally believed that a resumption will not be effected before May 15, or possibly June 1.

The following are the prices nominally quoted, although any actual buying brings a premium on these:

Broken	$4.50
Egg and stove	5.00
Chestnut	5.25
Pea	3.25
Buckwheat	2.75
Rice	2.25
Barley	1.75

Philadelphia, Penn.

It looks now as if peace between the miners and operators was about to be concluded. There is no doubt that some sort of arrangement has been made between the sub committees which will in due course be submitted to the committees of the whole, and it will be simply a matter of form to have favorable action passed on their findings by the several representatives of the operators and miners. Concessions on both sides have doubtless been made, and more than likely the middle of May will find the miners back to work under the new arrangements. This is further borne out by the fact that it is understood that the wholesale people are receiving numerous inquiries for prices, and while none are quoted, there seems to be a disposition to inform the dealers that the next week or ten days will see a basis of prices established for the coming season.

Of course, it is useless to speculate what the prices will be when announced. The chances are very much in favor of an advance over last year for some of the sizes, probably stove and pea. There may be a general advance all along the line in the domestic sizes, most if not all of the companies having practically all their output of the smaller sizes covered by contracts entered into the beginning of the year. These were $1.75 for pea, $1.25 for buckwheat and 85c. for rice. Car-

load lots may bring more than these prices, but the companies as a rule are almost covered up to their normal output of these small sizes and there is little to be had.

The retail trade in this vicinity is practically *nil*. Springlike weather has caused many fires to be drawn, and most householders are able, by sweeping up the corners, to accumulate sufficient to carry them over the few cool days which appear.

Pittsburg

Bituminous—The mines are opening rather slowly, demand being light. While the formal opening occurred the beginning of last week, in the early part of this week the mines in the Pittsburg district are probably not operating 50 per cent. of full capacity. Consumers are still using stocks and it is quite clear that one of two things was the case: Either consumers laid in too large stocks, or the operators reached a settlement with the miners too quickly. As the operators profited by the stock up, which advanced the market very materially and furnished an excellent tonnage, they are not disposed to complain of the stocking, and are endeavoring to avoid trouble from the scale being adjusted too quickly, by refraining from opening their mines until there is pressure for coal.

A definite effort will be made to hold the market on the basis announced in our report last week, $1.22½, against $1.15 a year ago, even though the $1.15 price was not uniformly maintained and the 7½c. advance more than covers the advance in the wage scale. Thus far the market has not been seriously tested, demand being so light, but we do not hear of any cutting.

Shipments in the lake trade will start Wednesday, May 1, when the freight rate goes from 88 to 78c., but they will be light at the start, and entirely on old contracts. There is still negotiation on new contracts and the parties are not getting together very rapidly. We quote: Mine-run and nut, $1.22½; ¾-in., $1.32½; 1¼-in., $1.47½; slack, 82½c. per ton at mine, Pittsburg district.

Connellsville Coke—Production and consumption are adjusted very closely, and the market is inactive. We note a sale of 10,000 tons of furnace for May delivery, at about $2.50, ovens, which about represents the market. Furnaces are in a comfortable position at present, but many will need to contract for second half, having contracts at $1.55, $1.60 and $1.65 which run out June 30. As a rule these furnaces cannot afford to pay $2.50, considering the price of pig iron and the question is whether sufficient demand will develop to cause more furnaces to blow in. They would only come in at higher pig-iron prices, which would justify the higher price for coke. We quote: Prompt furnace, $2.50; contract (nominal), $2.25; prompt foundry, $2.75; contract foundry, $2.40@2.50, per ton at ovens.

The *Courier* reports production in the Connellsville and Lower Connellsville region in the week ending Apr. 20 at 396,320 tons, a gain of 33,000 tons, and shipments at 4129 cars to Pittsburg, 6403 cars to points West and 1122 cars to points East, a total of 11,654 cars, or an increase of 621.

Buffalo, N. Y.

There is still very little life in the coal trade. Anthracite will return to its own in a short time, with the trade in excellent shape, and with conditions the best for a profitable season, but there is very little that is hopeful in the bituminous outlook. The operators are eager to give to the consumers not only every advantage offered them, but even more. A scale of prices has been made by the leading Pittsburg companies, but it is already reported that it has been cut pretty badly, with the exception of slack, which appears to be strong everywhere. This is largely due to the fact that the lake trade is backward and not much slack has been made.

All the wage scales at mines tributary to this market have now been settled, and the miners are to get 3c. or more increase in pay, but it does not appear that the mine owners will profit much by the new scale, unless it may be in the case of the anthracite interests. At least there has been no selling of coal in April at the usual reduction and the rumor that the new scale will be advanced is still very persistent and will no doubt eventually materialize.

The Canadian coal situation was much affected by the congestion of rail traffic before the mines shut down. At that time there was coal, mostly bituminous, side-tracked everywhere, waiting for motive power to move it. This coal is now being delivered and it affects present sales seriously. When it is all in, some of the consumers will have a year's supply on hand. There are so many conditions favoring a slow bituminous market that not a few of the mine owners are holding off or starting only in part in order to meet some regular order or contract.

The lake trade is now on and there is soft coal loading at Erie and Ohio ports, but there is no anthracite for that trade anywhere. It was claimed that there was a large stock of anthracite held at various points, waiting release as soon as the mining scale should be fixed, but this is denied by shippers. They were just able to satisfy their regular trade when the suspension took place so that it is practically impossible that any important surpluses could have been accumulated at that time.

Bituminous prices for this market are nominally $2.57½ for Pittsburg three-quarter, $2.47 for mine-run and $2.10 for slack, with coke hardly so strong as formerly at $4.75 for best Connellsville foundry. Most prices are weak and the market is very unsteady generally for bituminous sizes. There is every prospect of the supply exceeding the demand considerably.

Baltimore, Md.

While there was a somewhat better demand for coal in the Baltimore market during the past week, it was not sufficient to affect prices in the least. Low-grade coal is now quoted around 80 and 90c., while the second best grade is bringing $1.10, and the best big vein $1.65 per ton.

There is no rush for the product, and consumers find not the slightest difficulty in getting all the fuel they want at greatly reduced prices. Many of the Baltimore operators are still delivering under contracts closed in March, but these deliveries will probably be completed by the end of next week. The trade is quick to admit that it will be some time before contracts are closed at any such figures as those given by consumers, who were willing to pay anything for their supply rather than be caught short in case of a prolonged strike. The sentiment in Baltimore is that there will not now be a serious strike in the United States for many years to come.

It was pointed out in the past week that before the time for the next wage-scale conferences arrives, the Erdman act will have been amended so as to include coal fields as well as the railroads. In the event that the act is so amended, meditation can be resorted to, should the miners and operators be unable to reach a satisfactory agreement between themselves.

Some indication of just how active the demand was during March, while the English strike was in progress and labor troubles threatening here, is given by the statement of coal tonnage handled by the Baltimore & Ohio R. R. for that month. The total tonnage was 3,173,168 as compared with 2,027,245 for the same month of 1911, making a gain of 1,145,923 tons for March of this year. The coke tonnage for the month shows a decrease, the total for March being 384,09[illegible] tons, as against 371,219 tons for the corresponding period of the preceding year.

The Consolidation Coal Co. will, in all probability, begin the shipment of coal from its new mines in the Elkhorn Valley of Kentucky some time in June. The new railroad which this company is building is nearing completion, and will be operated by the Baltimore & Ohio R.R Company.

Columbus, Ohio

The coal trade in Ohio is in a state of anticipation. Since the mining scale was formally signed by the operators and miners, everyone engaged in the trade is looking forward to considerable activity. While there is a pretty fair stock of coal in certain sections, everything indicates a rather active season and preparations are being made accordingly.

The majority of Ohio mines will resume operations May 1, although some have been in operation during the past week in eastern Ohio. In the Hocking Valley the New Pittsburg Coal Co. had several mines in operation by Apr. 22.

Quotations in Ohio are soft, excepting in the small sizes, which are the strongest feature in the trade. There is a good demand for both nut, pea and slack and coarse slack and this will probably continue until the lake trade becomes active. Jobbers having nonunion connections have been placing a small tonnage in central Ohio, although most of the railroads and many of the manufacturing establishments are stocked until the latter part of May.

Great results are expected from the lake trade this season. Preparations are being made to ship a large tonnage from Ohio mines to the Northwest, as there is practically no coal being carried over on the docks. The reduction by the Pittsburg Coal Co. of the dock price from $3.50 to $3.40 is expected to have a considerable effect on lake conditions. The jobbers in the Northwest are asking that the 10c. be taken off the price at the mines in order that they can compete with the Pittsburg Coal Co. There is still considerable ice in the upper passages and little coal will be moved in that direction until the middle of May. A number of lake boats will be loaded, however, previous to that time, to be moved as soon as insurance is obtainable on boats and cargoes.

Prices which prevail in the Ohio fields are:

Hocking Valley

Domestic lump	$1 50
2-in.	1 35
Nut	1 20
Mine-run	1 10
Nut, pea and slack	0 90
Coarse slack	0 80

Pittsburg No. 8

2-in.	$1 30
Mine-run	1 10
Coarse slack	0 80

Gray Bend

Domestic lump	$1. 60
2-in.	1 40
Nut	1 25
Mine-run	1 15
Nut, pea and slack	0 95
Coarse slack	0 85

Kanawha

Domestic lump	$1 50
2-in.	1 30
Mine-run	1 10
Slack	0 80

There is some stir in domestic circles, but little is expected in that direction until after June 1. Some inquiries are being received for the fancy grades, such as West Virginia splints and the rescreened grades. Dealers are carrying some stocks over.

Hampton Roads, Va.

While the market is not nearly as strong this week as it has been during the past six or eight weeks, there is, nevertheless, a heavy demand for Hampton Roads coal. In fact, up to the present time the month of April has broken all previous records in the way of shipments from the piers at Lamberts Point, Sewalls Point and Newport News, the Norfolk & Western piers at Lamberts Point leading the other two by a good margin. For the first 18 working days this month they dumped on an average of 21,666 tons a day.

Work has commenced on the new Norfolk & Western piers and with improved conditions both here and at Newport News, Hampton Roads gives promise of becoming the leading coal center in the world. The Chesapeake & Ohio Ry., in testing out one of their new Mikado engines, on Thursday, pulled 110 steel coal cars from Richmond to Newport News in approximately five hours. They are putting several more engines of this type into commission and while they will not be called upon to carry such a load upon every run, this class of equipment is a long step in the way of better movement on tidewater coal.

There are still a number of vessels, foreign and American steamers, schooners and barges anchored in the Roads awaiting berth to load cargoes of coal. Indications are now, however, that these hold-overs will be disposed of within the next week. The local coal market still continues steady with prices on spot coal ranging from $2.75 to $3.

Charleston, W. Va.

With two-thirds of the mines in the Kanawha district closed down on account of the strike and with both sides playing for position there has been no important change in conditions over those prevailing a week ago. Despite the fact that little coal is being shipped there has been no increase in the price.

Detectives have arrived to guard the property of the coal companies in the event of trouble, and also for the purpose of ejecting the miners if they refuse to return to work at the old terms and conditions. Up to the present time, however, the companies have not ordered the men from the houses, but this is one of the moves expected every day and when it is taken trouble will follow that will doubtless require the calling out of the militia.

The strike has had no effect in the New River and Pocahontas districts, nor are any mines reported closed in the Fairmont region. There are a few mines out, however, along the Ohio River section, in the northwestern portion of the state.

The car supply has been good and selling agencies have been busy trying to sell coal at prices that are considered fair, but not the figure that was believed would prevail with so many mines closed.

Louisville, Ky.

The warm weather and fine boating stages have had the effect of solving the strained situation which existed in connection with the local coal supply. The only inconvenience caused was in domestic. Now that the threatened coal-mining troubles have practically disappeared, those who were storing coal for emergency uses, especially the railroads, are letting it go. The heavy shipments by water from the Pittsburg district are also helping to establish normal retail prices for this time of the year. The local dealers are advertising reduced prices as an incentive for customers to lay in a supply for next winter.

Indianapolis

Only a few Indiana mines were reported to be in operation during the week. Mines operated in connection with manufacturing concerns were permitted to work, but those in southern Indiana, producing coal for railroads, were ordered to cease operations when it was found they were hauling coal to the general market.

The retailers are booking orders for immediate shipment to fill their summer storage orders when the mines resume operations. The mine operators say that improvements to their plants are about completed, and that the mines will be found in first-class condition when operations begin, which is expected in a few days.

Chicago

According to indications, the Chicago market will witness little buying for another month. A number of big consumers have cars of coal on their sidings which they are willing to sell to other consumers if the latter would offer a fair price.

Chicago dealers have been advised that the Ohio mines have arranged to add 5c. to last year's contract figures. The Indiana mines have added 7c. a ton to the old contract prices on mine-run and screenings and 10c. on lump coal. It is believed that this price will hold. The Illinois producers say that they will be obliged to add 12½c. a ton to last year's prices in order to come out even.

Prices of coke have been marked down. The furnace and foundry cokes have been

held at a rather stiff figure, in anticipation of a strike. These prices could not hold through the present period of dullness, and there has been a shading of values.

Prevailing prices at Chicago are:

Sullivan County:	
Domestic lump	$2.62@2.87
Egg	2.50@2.75
Steam lump	2.17
Screenings	1.67@1.82
Springfield:	
Domestic lump	$2.57@2.82
Steam lump	2.17
Mine-run	1.97@2.07
Screenings	1.67@1.82
Clinton:	
Domestic lump	$2.52@2.77
Steam lump	2.17
Mine-run	1.97@2.07
Screenings	1.67@1.77
Pocahontas and New River:	
Mine-run	$3.15
Lump and egg	4.05

Coke—Prices asked for coke are: Connellsville and Wise County, $4.75; byproduct, egg and stove, $4.55; byproduct, nut, $4.55; gas-house, $4.75.

St. Louis, Mo.

There is practically no change in the St. Louis coal market, as there has been little or no demand. The latter part of last week a few of the mines in the Standard field opened up, the first of these being the mine at Nashville, Ill., on the L. & N. R.R.

The Standard market opened up with 2-in. lump coal selling at from $1.15 to $1.25, and screenings from 90c. to $1. A few of the Carterville mines opened up, but there is very little demand for the coal, and it is being offered at from $1.25 to $1.40 for the lump, egg, and nut.

It is almost impossible to say what the developments will be before the present week is over, but indications are that prices will go down to about the cost of production, as there is no market, and the producers will try to operate their mines regardless of conditions.

Portland, Ore.

Nothing new or startling has developed in the coal trade in this district for some time and business is barely normal, owing to the fair condition of the weather. Receipts by rail have been ordinary in volume with very little coming in by water. No more Australian coal will arrive here until next fall and the stock on hand is quite sufficient to meet all demands. The demand for coal the past winter was lighter than usual on account of mild weather and keen competition from wood dealers. Prices remain unchanged.

Production and Transportation Statistics

Shipments to Our Non-contiguous Possessions

Alaska—Fuel shipments to Alaska for February of the present year amounted to 2244 tons as compared with 1341 tons during the same month last year.

Porto Rico—Total shipments of bituminous coal to Porto Rico during February of the current year amounted to 4555 tons as compared with 6165 tons during the same month last year. No anthracite was shipped to Porto Rico during February of last year, and only 101 tons this year.

Consolidation Coal Co.

During the year 1911, the Consolidation and its subsidiary companies mined 8,231,903 tons of coal, and made 43,740 tons of coke. The coal mined by lessees amounted to 473,008 tons.

Baltimore & Ohio Railroad

The total tonnage hauled over the lines of the Baltimore & Ohio for the month of February was 2,695,874 tons as compared with 1,701,846 tons for the corresponding month of 1911, making a gain for February of this year of 994,028 tons.

Atlantic Coastwise Movement

Comparative statement of fuel shipments, in long tons, from five principal Atlantic ports for February, 1911-12, including bunker coal placed on vessels in the domestic and foreign trade and comprising probably 90% of the total shipments from these points.

	1911	1912
New York	1,867,893	2,4 0,043
Philadelphia	526,422	412,011
Baltimore	356,601	286,085
Newport News	233,685	237,682
Norfolk	267,300	428,036
Total, 5 ports	3,251,901	3,833,857

Government Coal Contracts

Western Division — Sealed proposals will be received until 11 a.m., May 10, 1912, for furnishing fuel required at the posts of the Western division during fiscal year commencing July 1, 1912. Prospective bidders should address Post Quartermasters or Quartermasters at Seattle, Wash., and Portland, Oregon.

Eastern Division—Sealed proposals in triplicate for furnishing coal required in the Eastern division during year ending June 30, 1913, will be received until 10 a.m., May 15, 1912. Bidders should address Chief Quartermaster, Governors Island, New York Harbor.

Pacific Coast — Sealed proposals in duplicate will be received until 11 a.m., May 24, 1912, for furnishing fuel for the fiscal year beginning July 1, 1912, at Bear Island, Calif.; San Francisco, Calif., and Bremerton, Wash. The right is reserved to reject any or all bids or parts thereof and waive informality therein. Bids from regular dealers only will be considered. Prospective bidders should address the Depot Quartermaster, Marine Corps, 182 Second St., San Francisco, Calif., or the commanding officer or Post Quartermaster, Marine Barracks, at the station named.

Norfolk & Western Ry. Co.

Comparative statement of coal and coke shipments over the lines of the N. & W. Ry. Co. for March, 1911-12, was as follows, in short tons:

Destination	1912	1911
Coal		
Tidewater, foreign	146,089	90,188
Tidewater, coastwise	286,343	236,233
Domestic	1,353,330	980,033
Coke		
Tidewater, foreign	8,859	5,117
Domestic	140,298	163,141
TOTALS	1,934,916	1,475,012

Financial Notes

The O'Gara Coal Co. reports for the fiscal year ended Oct. 31, 1911: Gross earnings, $3,671,460; net profit, $335,171; surplus for year, $283,810; total surplus, $568,522. The company has $1,000,000 of 5% preferred stock, $5,000,000 of common and $3,000,000 of bonds. The company operates mines in Saline County, Ill.

Confirmation of the report now in circulation that the preferred dividend of the Pittsburgh Coal Co. will be increased from 5% to 7% annual basis cannot be confirmed in official quarters. It is stated that the matter has not been discussed by the board and that such increase is not contemplated at the present time.

General expenses and fixed charges of the Lehigh Coal & Navigation Co. for the year ended Dec. 31, 1911, were $432,610 for taxes; interest on funded debt was decreased $101,605, chiefly by retirement of the consolidated mortgage 7s. Against this latter was a full year's interest on the collateral trust 4½% loan issued Nov., 1910, making a net decrease in interest on funded debt of $35,980.

The coal-mining department of the Delaware & Hudson Co., which forms a considerable part of the company's business, brought in but a small amount of profit directly. On a gross business of $13,355,000 only $116,000 remained as net profits and, after paying taxes on the property, there remained a deficiency for the year of $24,000. Last year the mining profits were but $42,000 on $11,806,000 worth of coal sold.

The Pittsburgh Coal Co., after carrying to credit of undivided earnings account the net earnings for the year and charging the four dividends of 1¼% each or 5% on the preferred stock outstanding ($1,353,590), the amount to its credit Dec. 31, 1911, was $8,481,541 an increase of $38,347 over 1910). There has been no readjustment in the values of any of the assets sustaining this credit, and they are believed to represent a greater worth than they are carried at, not including coal rights which are largely in excess of book value.

The directors of the Island Creek Coal Co. will probably place the 100,000 shares of common stock on a dividend basis of $3, beginning with the coming October. The current year is expected to show output of between 2,000,000 and 2,200,000 tons of coal as compared with 1,876,000 tons mined during the fiscal period of Dec. 31 last. At prices which the company is getting for its coal additional $250,000 more may be figured for the common stock above the $2.34 secured in last year. This means that the common stock will this year earn close to $500,000 against $233,357 in 1911.

Index of Coal Literature

Monthly list of the world's best articles on coal and coal mining

The following is a list of abbreviations used below:
A.E.G.-Ztg. = A.E.G.-Zeitung.
Ann. Mines = Annales des Mines.
Ann. Mines Belgique = Annales des Mines de Belgique.
Berg-Hüttenmänn. Rdsch. = Berg- und Hüttenmännische Rundschau.
Bull. Am. Inst. Min. Eng. = Bulletin American Institute of Mining Engineers.
Bull. Assoc. Ing. Liège = Bulletin de l'Association des Ingenieurs sortis de l'Ecole de Liège.
Bull. Ass. Sucr. = Bulletin de l'Association des Chimistes de Sucrerie et de Distillerie de France et des Colonies.
Can. Eng. = Canadian Engineer.
Chem. Eng. = Chemical Engineer.
Coll. Guard. = Colliery Guardian.
Compt. Rendus Acad. Sc. = Comptes Rendus de l'Académie des Sciences.
El. Eng. = Electrical Engineering.
El. Jl. = Electrical Journal.
Eng. Contract. = Engineering Contractor.
Eng. Min. Jl. = Engineering and Mining Journal.
Eng. News = Engineering News.
Geol. Mag. = Geological Magazine.
Giess.-Ztg. = Giesserei-Zeitung.
Iron Coal Trades Rev. = Iron and Coal Trades Review.
JB. Berg-Hüttenw. Sachsen = Jahrbuch für das Berg- und Hüttenwesen im Königreich Sachsen.
Jern. Kont. = Jern Kontorets Annaler.
Jl. Soc. Chem. Ind. = Journal of the Society of Chemical Industry.
Jl. Gasbeleuchtung = Schilling's Journal für Gasbeleuchtung und Wasserversorgung.
Jl. Royal Soc. Arts = Journal of the Royal Society of Arts.
Jl. S. Afr. Inst. Eng. = Journal of the South African Institute of Engineers.
Kohle Erz = Kohle und Erz.
Mines Minerals = Mines and Minerals.
Min. Sc. Press = Mining and Scientific Press.
Min. World Eng. Rec. = Mining World and Engineering Record.
Mitt. Ver. Moorkultur = Mitteilungen des Vereins zur Förderung der Moorkultur im Deutschen Reich.
Mon. Ind. Gaz = Moniteur de l'Industrie du Gazet de l'Electricité.
Montan. Rdsch. = Montanistische Rundschau.
Oesterr. Tonind.-Zeitung = Oesterreichische Tonindustrie-Zeitung.
Oesterr. Z. Berg- Huttenwes. = Oesterreichische Zeitschrift fur Berg. und Hüttenwesen.
Rev. Noire = Revue Noire.
Rev. Univ. Mines = Revue Universelle des Mines.
Rock Prod. = Rock Products.
S. Afr. Min. Jl. = South African Mining Journal.
Stahl Eisen = Stahl und Eisen.
Stein-Braunkohle = Stein und Braunkohle.
Tech. Rdsch. = Technische Rundschau.
Trans. Inst. Min. Eng. = Transactions of the Institution of Mining Engineers.
Trans. Manchester Geol. Min. Soc. = Transactions of the Manchester Geological and Mining Society.
Ung. Mont. Ind. = Ungarische Montanindustrie und Handelszeitung.
Z. El. Mach. = Zeitschrift für Elektrotechnik und Maschinenbau.

Note: We shall be glad to obtain for readers, where possible, copies of the papers referred to.

I—GENERAL

Coal on Vancouver Island, B. C. E. Jacobs, Can. Min. Jl., Vol. 32, 1911, 24, pp. 807-8.

The World's Coal Production. Coal Age, Vol. 1, 13, pp. 398-400, 2 fig. (A synopsis of available statistics and notes on different fields.)

World's Coal Production and Consumption. Iron Coal Trades Rev., Vol. 83, 1911, 2287, pp. 1057-8, 8 tab.

The Mining Year Book 1912, 8vo. Financial Times, London, S3.75, net.

Coal and Coke Exports in 1911. Coal Age, Vol. 1, 13, p. 417. (American Export has trebled in 12 years, now amounts to 80 million dollars.)

The Colliery Guardian Review of the Coal Trade in 1911. Edit. by H. Greenwell, 8½x5½, 161 pp., 8vo. Colliery Guardian, London, 25c., net.

Scientific Coal-Mine Management. Sim and W. H. Reynolds, Mines Minerals, Vol. 32, pp. 459-60, 2 tab. (Three devices by which accurate knowledge of working conditions can be had daily.)

Notes on Mine Accounting. T. H. Sheldon, Eng. Min. Jl., Vol. 92, 1911, 26, pp. 1231-2.

Minimum Wage Boards. F. Kelley, Am. Jl. Sociology, Vol. 17, 3, pp. 303-14.

Treatise on the Law and Practice relating to Letters Patent for Inventions. R. Frost, 2 vols., 4th Edtn., Ryl., 8vo., Stevens & Hall, London, S9.50.

Western Coal Land Legislation. Mines Minerals, Vol. 32, 1911, 5, pp. 277-8. (System of leasing to avoid long time speculative investment. Present coal land laws.)

The Mining Law. H. V. Winchell, Min. Sci. Press, Vol. 104, 10, pp. 366-70. (The faults of Canadian and United States mining laws, and suggestions for changes. A comparison of English and American systems. The fundamental differences in the concession systems of South Africa and Australia. Claim systems, American regalian right.)

The Smokeless Coal Field of West Virginia. Edwin Ludlow, Mines Minerals, Vol. 32, pp. 467-8, 1 tab. (Legal and business conditions which operate to promote the wasteful exploitation of coal lands.)

American vs. English Mine Fatalities. J. T. Beard, Coal Age, Vol. 1, 13, pp. 403-5, 1 tab. (American output per man double that in England. Pennsylvania death rate lower than Great Britain's. Conditions in American mines.)

Fatal Accidents in Mines in 1911. Colliery Guard, Vol. 103, 2664, pp. 128-9.

Coal Supply and Coal Prices. (Kohlenversorgung und Kohlenpreise.) Konjunktur, 1911, Vol. 3, 11.

Price Policy of the Coal Syndicate. (Die Preispolitik des Kohlensyndikates.) Konjunktur, 1912, Vol. 3, 16.

The Technical Features of the Sale of German Coal in Germany. (Die Technik des Absatzes deutscher und englischer Steinkohlen in Deutschland.) Hans Jeschke, Z. Handelswiss, 1912, Jan., pp. 333-9.

The Prussian State and the Coal Syndicate. (Der Preussische Staat und das Kohlensyndikat.) L. Eschwege, Bodenref, 1912, 2, pp. 28-30.

II—GEOLOGY

Studies in Mine Surveying. (Studien zur Markscheidekunde.) E. Dolezal, Berg-Huettenmaen. JB., Vol. 59, 1911, 2, pp. 99-134, 2 fig. (Strict compensation of an open polygon.)

The Geology of Coal. J. Sim, Iron Coal Trades Rev., Vol. 84, 2297, pp. 365-6. (The term includes a large number of substances from peat to anthracite, the humic rather than the anthracite are, from the commercial point of view, the most perfect types of fuel. Paper read before the Scot. Fed. Inst. Min. Students, Glasgow.)

The Weathering of Coal Seams. T. Coventry, Mines Minerals, Vol. 32, 1911, 5, pp. 273-5, 2 fig., 3 tab., 1 map. (Peculiar geological conditions at the Charlie Coal Mines, Queensland.)

Metamorphism and Geological Structure in the Narragansett Basin, Rhode Island. F. H. Lahee, Am. Jl. Sci., Vol. 33, 195, pp. 249-62, 7 fig. (The basin is a body of carboniferous strata 50 miles long and from 14 to 25 miles wide, with a stratigraphic thickness of two miles.)

III—MINING TECHNOLOGY

Penn Mary Coal Mines, Heilwood, Penn. R. D. Hall, Coal Age, Vol. 1, 1911, 8, pp. 237-41, 5 fig., 1 map. (Some important and distinctive features of the plant described.)

Ore and Coal Mining Machinery. C. A. Tupper, Mines Minerals, Vol. 32, 8, pp. 454-5. (Their similarity and what each branch of the industry owes the other for its development.)

Buckner No. 2 Mine United Coal Co. Mines Minerals, Vol. 32, 1911, 5, p. 272, 1 fig. (The mechanical equipment of a thick coal bed mine in Illinois.)

An Outline of Mining. W. H. Coghill, Col. Sch. Min Mag., Vol. 2, 1911, 3, pp. 66-7. (An exhaustive outline of all appliances and methods used in every description of mining.)

Coal Cutting Machinery. W. B. Shaw, Colliery Guard., Vol. 103, 2672, pp. 527-9, 12 fig.; 2673, pp. 584-5. (A comparative review of the relative advantages of the various types of rotary machines.)

Crushing Coal for Boiler Use. Mines Minerals, Vol. 32, 1912, 6, p. 349, 2 fig. (The Jeffrey single-roll crusher employed at Pocahontas Consolidated Collieries, McDowell County, W. Va.; this machine has wooden pins on hub engaging holes in pulley; any undue strain shears the pins and stops machine.)

An Anthracite Plant at Hazleton, Penn. Coal Age, Vol. 1, 1911, 10, pp. 310-1, 1 diag. (The Andenried breaker of the Lehigh & Wilkes-Barre Coal Co., handling 1500 tons daily, layout of rolls, conveyors, screens, etc.)

A 150-ton Revolving Steam Shovel for Stripping Operations. Eng. Contract., Vol. 36, 1911, 25, pp. 650-1, 1 fig. (A new type designed for stripping overburden from the coal in Illinois coal fields.)

IV—WORKING OF MINERALS

Elementary Coal Mining. G. L. Kerr, 3rd Edtn., 8vo., 7½x4¾ in., 234 pp., C. Griffin, London, 90c.

A Modern Twin Coal Mining Plant. W. R. Roberts, Coal Age, Vol. 1, 1911, 8, pp. 324-7, 7 fig. (The Bunsen Coal Co., Danville, Ill. The plant runs the two mines in which only the shafts and tipples have individual service.)

Coal Mining Methods in Michigan. R. B. Hosken, Coal Age, Vol. 1, 1911, 8, pp. 242-8, 4 fig. (Interesting use of machines in low levels, in seams 26 to 42 in. thick.)

Methods of Mining in Southern West Virginia. L. J. Marshall, Coal Age, Vol. 1, 1911, 10, pp. 302-6, 5 fig., 1 tab. (The retreating system in gas seam No. 2 Page, Fayette County, W. Va.)

Anthracite and Bituminous Mining. E. T. Conner, Coal Age, Vol. 1, 1911, 9, pp. 277-80, 10 fig. (Methods of operating in New River field, W. Va.; several plants described.)

The Working of the Thick Coal Seams of Upper Silesia. B. C. Gullachsen, Trans. Inst. Min. Eng., Vol. 46, 1912, 2, pp. 209-18, 2 tab., 1 pl.

Maltby Main Colliery. Iron Coal Trades Rev., Vol. 84, 2298, pp. 403-4, 4 fig. (The mines near Doncaster comprise some 6000 acres. The article covers all the operations from sinking the shaft to the delivery of the coal and the mechanical equipment.)

V—BORING, SHAFT SINKING AND TUNNELING

Driving Stone Drifts through Water Bearing Strata. R. Watkin, Iron Coal Trades Rev., Vol. 84, 2294, pp. 248-9. (Some interesting difficulties met with are stated in the paper read before the Yorks. Nat. Assoc. Col. Mgrs.)

Shafts for American Coal Mines. R. G. Johnson, Mines Minerals, Vol. 32, 1912, 6, pp. 344-7, 8 fig. (Methods employed in sinking, their dimensions, timbering or lining with concrete, etc.)

Use of Grout in Shaft Sinking. R. G. Johnson, Coal Age, Vol. 1, 20, pp. 639-41, 5 fig. (One of the chief difficulties of shaft sinking lies in dealing with water encountered. Forcing cement grout into the fissures of water bearing strata by means of compressed air is a new and effectual solution of this problem.)

The Advantages of Freezing as a Method of Sinking Through Heavily Watered or Difficult Ground. W. B. Wilson, N. England Inst. Min. Mech. Eng., Vol. 62, 1911, 1, pp. 36-44. (Some fresh details given in the continued discussion.)

Rules of International Union of Deep Boring Engineers in Vienna. (Satuten des Internationalen Vereins der Bohringenieure und Bohrtechniker in Wien.) Z. Int. Ver. Bohringenieure, 1912, 1, pp. 1-3.

VI—BLASTING, EXPLOSIVES

A New Explosive "Stygia." (Explosivos Stygia.) Mem. Est. Major, Chile, 1912, Jan., pp. 19-20. (This new explosive, invented in Brazil, has all the advantages of dynamite without many of its disadvantages. Description and results of experiments.)

VII—TIMBERING, PACKING, ETC.

Mining without Timber. R. B. Brinsmade, 8vo., Ldn. Hill, 1911, $3.15.

Longwall Mining in Illinois. Mines Minerals, Vol. 32, 8, pp. 451-4, 1 fig., 6 ill., 1 tab. (Plan used in mines of Spring Valley Coal Co. Method of timbering. Building Cogs.)

Accidents in Mines Caused by Falls of Grounds. G. B. Harrison, Trans. Inst. Min. Eng., Vol. 46, 1912, 2, pp. 260-73, 3 tab. (The widespread occurrence of such accidents and the great total mortality from them. Presidential address and discussion.)

Hydraulic Packing in the North of France. Colliery Guard., Vol. 103, 2673, p. 595. (The material used in the Liévin coal mine is the earth removed from the shafts, graded into two grades from 0 to 40 mm. and 40 mm. to 120 mm. in size, and treated in breakers turning out 30 cu.m. per hr.; from the hopper the material is conveyed in pipes to the place of deposit.)

Shaft Raising in Hard Rock. Mines Minerals, Vol. 32, 8, pp. 495-6, 9 fig. (Methods of timbering, drilling, blasting, and handling the rock in shaft.)

The Action and Control of Differently Constituted Coal Roofs. H. Hepplewhite, Trans. Inst. Min. Eng., Vol. 46, 1912, 2, pp. 366-81, 23 fig., 1 pl. (Various methods of supporting roofs described and discussed.)

VIII—WINDING AND HAULAGE

Trials with Electric and Steam Winding Engines. Colliery Guard., Vol. 103, 2670, pp. 426-7, 4 tab. (Report of Committee to German Assoc., Dortmund Min. Assoc. and Boiler Insp. Assoc.)

Mine Headgears. G. Morris, Jl. S. Afr. Inst. Eng., Vol. 10, 1911, 4, pp. 83-5.

Gravity Planes with Monitors. Coal Age, Vol. 1, 1911, 10, pp. 312-13, 6 fig. (The economy in actual practice of gravity haulage, using monitors; available on all grades over 5 per cent.)

Track Arrangement for Shaft Bottoms. O. Cartlidge, Mines Minerals, Vol. 32, 1912, 6, pp. 336-7, 4 fig.

Model Steel Tipple at Annabelle Mines. W. A. Weldin, Mines Minerals, Vol. 32, 1912, 6, pp. 325-31, 12 fig. (Newest methods in building construction and coal handling in West Virginia.)

A Self Dumping Car Haul System. Coal Age, Vol. 1, 19, pp. 605-7, 5 fig. (A description of the Greene car-haul and automatic dumping system as installed at the Burnside Colliery, Penn. The apparatus includes a novel arrangement for recording the work of the tipple and is an important labor saver.)

Haulage System at Gray Creek Mine. F. W. Whiteside, Mines Minerals, Vol. 32, 1911, 5, pp. 264-5, 5 fig.

Wire Ropes as Applied to Mining. D. Baird, Trans. Inst. Min. Eng., Vol. 42, 1912, 1, pp. 129-41, 3 tab.; 2, pp. 288-300. (The increasing danger incurred in the increasing depth of shafts and heavier loads.)

The Shaw Hemsworth Overwinder. T. Beach, Trans. Inst. Min. Eng., Vol. 42, 1912, 1, pp. 92-8, 9 fig. (The effective automatic prevention of overwinding by this device described.)

A Comparison of Electric and Compressed Air Hoisting from Deep Mine Shafts. K. A. Pauly, Eng. Contract., pp. 7-11, 2 fig., 4 tab.

IX—SIGNALING

Relay Indicator Signaling in Mines. J. Charlton, Iron Coal Trades Rev., Vol. 84, 2295, pp. 300-1, 2 fig. (If traffic delays are to be avoided, the system of signaling must be reliable. The speed-

ing up of haulages and the highly organized system of working sets of tubs, increases the value of signaling.)

Luminous Electric Mine Shaft Signaling. J. C. Eadie, Trans. Inst. Min. Eng., Vol. 42, 1912, 1, pp. 37-46, 4 fig. (Paper read and illustrated with working models for both light and sound.)

X—LIGHTING

Ignition of Gas by Electric Lamps. Coal Age, Vol. 1, 15, pp. 478-80. (Belgian tests showing that under certain conditions all electric-lamp filaments ignite firedamp in coal mines.)

The Holmes-Ralph Gas-Detecting Portable Electric Lamp. G. J. Ralph, Trans. Inst. Min. Eng., Vol. 42, 1912, 1, pp. 201-8, 5 fig.; 2, pp. 435-40. (A small lamp described, using only about half a watt and operating detectively by the catalytic action of platinum. Paper and discussion.)

Acetylene in Underground Mining. J. Deszennyi, Acetylene, Vol. 9, 100, pp. 13-4. (Lamps free from soot give bright light on less consumption of oxygen than oil lamps.)

XI—VENTILATION

Effects of Reversing a Main Air Current. J. S. Haldane and J. Bain, Trans. Inst. Min. Eng., Vol. 42, 1912, 1, pp. 155-61. (Discussion with special reference to proposed legislation on mine ventilation.)

Coal Mine Ventilating Equipment. W. M. Weigel, Coal Age, Vol. 1, 14, pp. 441-2; 15, pp. 470-1, 4 fig. (Methods of ventilation by means of mechanical ventilators.) Vol. 1, 19, pp. 610-13, 6 fig.; 21, pp. 671-4, 5 fig.; 24, pp. 769-72, 4 fig. (Description and theory of centrifugal and disc fans.)

The Working of Mines. Lessons on Dynamic Ventilators (Cours d'exploitation des mines.) Leçons sur les ventilateurs dynamiques.) L. Denoël, Ing., 74 pp., ill., Liège, D. et E. Close, 1911.

XII—MINE GASES, TESTING

The Physical and Chemical Properties of Mine Gases. G. H. Winstanley, Min. Eng., Vol. 16, 213, pp. 8-9. (Some criticism of the conflicting standards for inflammable gases and the practical difficulties arising from several of them.)

Release of Gas Accumulations. W. H. Cunningham and C. R. Conner, Coal Age, Vol. 1, 1911, 12, pp. 370-1, 1 fig., 1 map. (Borings release gas from abandoned mines.)

Methods of Testing for Mine Gases. W. R. Crane, Coal Age, Vol. 1, 1911, 12, pp. 376-7. (Additional tests given in paper read before Coal Min. Inst. Am.)

The Composition of Some Mine Gases. G. A. Burrell, Chem. Eng., Vol. 15, 1, pp. 1-8, 8 tab. (Also gives a description of a Simple Methane Apparatus. Read before Coal Min. Inst. Am.)

Pathogenic Mine Atmospheres. E. W. Chance, Coal Age, Vol. 1, 14, pp. 448-50, 6 tab. (The cause and conditions governing flame extinction and death by smothering gases in mines.)

XIII—COAL DUST

Automatic Sprinkling Apparatus for the Prevention of Dust in Mines. T. C. Futers, Coll. Guard., Vol. 103, 2662, p. 24, 3 fig.

The Use of Stone Dust in Relation to Coal Dust Ignition. W. C. Blackett, Iron Coal Trades Rev., Vol. 84, 2297, pp. 368-9. (Some simple applications for the prevention of explosions of coal dust being carried along the pit roads, are given in a paper read before the N. Eng. Nat. Assoc. Coal Mgrs.)

The Influence of the Presence of Gas on the Ignition of Clouds of Coal Dust by Single Electric Flashes. W. M. Thornton, Iron Coal Trades Rev., Vol. 82, 2294, p. 253, 2 fig., 1 tab. (Some new experiments described, and the results compared with former experience. Read before N. Eng. Assoc. Min. Eng.)

British Coal-Dust Experiments. W. E. Garforth, Trans. Inst. Min. Eng., Vol. 46, 1912, 2, pp. 220-45. (A full report of Altofts experiments are presented and lessons deduced from the investigation.)

Experiments on Liquid Mixtures for Laying Coal Dust. W. M. Thornton, Trans. Inst. Min. Eng., Vol. 42, 1912, 1, pp. 66-86, 1 tab.; 2, pp. 417-24. (The use of liquid soaps, disinfectants, water glass, solvents, binders, cresol, caustic soda and other mixtures dealt with and discussed.)

XIV—EXPLOSIONS

The Prevention of Explosions. Dr. J. Harger, Coll. Guard., Vol. 103, pp. 2671-3. (Discussion of the author's views on the possibility of preventing coal-dust explosions as presented before the Man. Geo. Min. Soc.)

The Briceville Mine Explosion. R. D. Hall, Coal Age, Vol. 1, 1911, 11, pp. 343-7, 4 fig., 1 map. (Much dry coal dust present through spilt coal in haulage, fan at foot of shaft, the Cross Mountain Mine, Knoxville, Tenn.)

Botton Creek Mine Explosion. Mines Minerals, Vol. 32, 1912, 6, pp. 332-3, 2 fig. (Conditions in the mine at the time of the explosion, its effect minimized by the moisture, quantity and split up supply of air. The steam-jet system.)

XV—MINE FIRES

Notes on Underground Fires. J. Ashworth, Coal Age, Vol. 1, 21, pp. 668-70. (Instances of fires caused by criminal negligence, carelessness, and the disregard of rules and mine regulations. Lessons taught by mine disasters. Spontaneous combustion in mines. Effect of mine temperatures. Direction of air current from pyrites in coal. Manner of handling mine fires.)

Extinguishing the Majestic Mine Fire. R. Y. Williams. Mines Minerals, Vol. 32, 1912, 6, pp. 342-3, 1 map, 1 tab. (Investigation by men wearing oxygen helmets enabled effective action to be taken.)

Earthquakes and Mine Explosions. Coal Age, Vol. 1, 22, pp. 702-3. (Discussions at the Conference of the International Association of Seismology on Radio-Active Products as Source of the Earth's Heat. Formation of mountains and valleys. The earthquake and the pendulum. Correspondence of seismic unrest with mine explosions.)

XVI—RESCUE AND AMBULANCE

Mine Rescue Work in Illinois. H. H. Stoek, Coal Age, Vol. 1, 19, pp. 598-600, 6 fig. (The rescue stations and three rescue cars. Men from these cars attend all mine disasters and train mine-rescue men at the surrounding mines.)

Use of Oxygen Helmet in High Temperatures. H. H. Sanderson, Mines Minerals, Vol. 32, 1912, 6, p. 335. (Tests carried out at Virginia City, Nev., at the 2450-ft. level in 165 deg. of temperature give satisfactory results.)

XVII—DRAINAGE, PUMPING, ETC.

The Evolution and Present Development of the Turbine Pump. E. Hopkinson and E. L. Allan, Machinery, Vol. 18, 7, pp. 533-6, 9 fig. (The evolution of the Osborne-Reynolds pump is traced, as being typical of the turbine pump at large.)

XVIII—PREPARATION

Consolidated Coal Washery at Saginaw, Mich. Mines Minerals, Vol. 32, 8, pp. 468-9, 4 ill.

Standardization in Coal Washing. G. R. Delamater, Mines Minerals, Vol. 32, pp. 461-5, 2 tab. (A plea for uniformity in tests and reports. Formulas for accurate comparison of washery work.)

Washing and Sorting of Small Coal. N. T. Williams, Cassier's Mag., Vol. 40, 1911, 7, pp. 606-28, 13 fig. (The apparatus employed in cleansing coal.)

XIX—BRIQUETTES

Automatic Furnaces for Brown-Coal Briquettes. (Maschinelle Fuerungen fuer Braunkohlen briketts.) El. Anz., 1911, 98, pp. 1263-64; 101, pp. 1301-3, 12 fig., 3 ill. (Automatic feeding device.)

Briquetting Presses Driven by Three-Phase Commutator Motors. (Brikettpresses-Antrieb mit Drehstrom-Kollekttormotoren.) Druckschr. Siebens-Schuckertw. (Working results, description of plants.)

Electric Driving of Briquetting-Presses. (Der elektrische Antrieb von Braunkohlenbrikettpressen.) A. Strauss, Techn. Rdsch., 1912, 7, pp. 74-5, 2 fig., 2 ill. (Description of two plants built by the Siemens-Schuckert Works.)

XX—COKE OVENS

Treating Coal for Coke Making. Coal Merchant, Vol. 24, 589, pp. 11-12, 4 fig. (The great advantage of washing, mixing, and crushing before charging the ovens.)

Source of the Coking Property of Coals. H. W. Hempel and F. Lierg, Jl. Gas Light., Vol. 116, 1911, 2536, p. 822. (From Zeit. für angewandte Chemie.)

Continuous Coking in Vertical Retorts. Coal Age, Vol. 1, 1911, 10, pp. 314-6, 2 fig. (Description of retorts, their numerous advantages and maximum efficiency.)

Development of a Byproduct Coke Oven Gas Plant. W. S. Blauvelt, Am. Gas. Jl., Vol. 96, 11, pp. 169-71, 4 fig., 1 tab. (In thermal efficiency and in total yield of gas the byproduct oven compares favorably with the best gas benches. All difficulties in the operation of the byproduct oven gas plant have been overcome.)

A Horizontal Flued Coke Oven. J. R. Marsden, Iron Coal Trades Rev., Vol. 84, 2298, p. 405, 3 fig. (Deals with several points of comparison between the horizontal and vertical flued ovens; and states that for simplicity and comfort in working, cost of upkeep and repairs, the horizontal is distinctly the better.)

A Retort Coal Quencher and Loader. A. Goodall, Coal Age, Vol. 1, 21, pp. 678-9, 3 fig. (Describes an apparatus for quenching and loading coke from retort ovens in one operation. A number of plants are in successful operation in England, and it is claimed that the machine will effect a considerable economy of labor.)

Modern Coking Plants with Utilization of the Byproducts. (Moderne Kokereien mit Gewinnung der Nebenprodukte.) A. Wagner, Bergbau, 1912, 1, pp. 1-6; 2, pp. 13-8; 3, pp. 29-33; 4, pp. 45-9, 23 fig. (Preparation of the coal; coking ovens; utilization of the byproducts.)

XXI—FUEL TESTING

Gas and Fuel Analysis for Engineers. A compendium for those interested in the economical application of fuel; prepared especially for the use of students at the Massachusetts Institute of Technology. A. H. Gill, 6th Edtn., 12mo., 7+139 pp., ill. N. Y., Wiley, 1912, $1.25.

The Testing of Coal. C. Ostler, Jl. Gas. Light., Vol. 117, 2546, pp. 582-4. (The paper shows what testing can be done in a small test plant.)

Coal Dust as Fuel. H. V. Hart-Davis, Iron Coal Trades Rev., Vol. 84, 2295, pp. 298-9, 3 fig. (A coal-dust fuel boiler and its uses are described. Much dust is allowed to blow to waste at the pit mouth which is of high calorific value.)

Deterioration of Coal in Storage. H. C. Porter and F. K. Ovitz, Mines Minerals, Vol. 32, pp. 475-6. (Results of experiments showing effect of weather on various coals under different conditions.)

XXII—STEAM ENGINES AND BOILERS

Steam Regenerative Accumulators. D. B. Morison, Coll. Guard., Vol. 103, 2674, pp. 629-32, 10 fig. (The Fife Coal Co.'s collieries illustrate the amount of mechanical power required to operate the plant necessary for coal getting at a group of modern pits. Four stations are each equipped with mixed pressure turbo-generating units of 750 kw. capacity. Exhaust steam is utilized to an exceptional extent.)

Methods of Driving by Gas Engines for Collieries. A. E. L. Chorlton, Trans. Inst. Min. Eng., Vol. 46, 1912, 2, pp. 315-50, 25 fig., 3 pl., 2 tab. (Some methods of drive, possibly as economical, if not more so, than the customary electrical modes.)

Bettington Boilers for Pulverised Fuel. Ry. News, Vol. 96, 1911, 2503, pp. 1422-3, 3 fig. (Efficient combustion promoted by intimate mixture of air and fuel.)

Power Installations in Pits; Gas, Steam and Electricity. (Installations motrices des houillières; le gaz, la vapeur et l'électricité.) J. Burns, Lumière El., 33, 1911, Vol. 26, 46, pp. 208-11.

XXIII—ELECTRICITY

Colliery Cables. H. G. Fraser, Iron Coal Trades Rev., Vol. 84, 2294, pp. 254-6. (A discussion upon the installation and maintenance of high-tension vulcanized bitumen cables. If the current density is kept within the limits laid down by the Home Office it may be used up to, or even above, 6600 volts.)

Electrical Accidents in Mines. M. Pickering, El. Rev. (Ldn.), Vol. 69, 1769, pp. 678-80. (Wire armoring and wooden casing as preventive of trouble in cases of roof or side falls or iron girders or runaway tubs.)

Winding Plant with Electric Drive by Variable-Speed Three-Phase Motors. El. Eng., Vol. 8, 5, Supp., pp. 9-11, 4 fig. (Plant of the Deri Motor for shaft depth 690 ft., net load 1.6 tons, speed 20 ft. per sec.)

Electric Transmission in Coal Mines. H. D. Jackson, Coal Age, Vol. 1, 15, pp. 484-5. (The true cost of electric power, rail, bonding, calculation of copper required.)

Electrical Equipment of the D., L. & W Mines, Penn. Coal Age, Vol. 1, 23, pp. 742-4, 4 fig. (An unusually complete and extensive electrification, motor capacity 27,618 hp. The central station and substation practice is outlined and the electric power in haulage, hoists, pumps and auxiliaries.)

Electric Winding Developments. F. Thursfield, Trans. Inst. Min. Eng., Vol. 42, 1912, 1, pp. 179-90, 1 fig. (Discusses the use of electric drive where waste gases or exhaust steam are available, but deprecates the substitution for live steam.)

Home Office Rules for the Installation and Use of Electricity in Mines. Iron Coal Trades Rev., Vol. 84, 2295, pp. 279-80. (Showing the alterations from the original draft which are of considerable importance.)

Motor Starters for Mining Work. A. P. Drake, Iron Coal Trades Rev., Vol. 84, 2295, pp. 287-8, 23 fig. (Resistance units, resistance starters, and alternating-current motor starters are all dealt with.)

XXIV—SURFACE TRANSPORTATION

Coal Developments at Stearns, Ky. J. E. Butler, Mines Minerals, Vol. 32, 8, pp. 481-2, 3 ill. (Use of an aërial tramway to transport coal across a river. Description of equipment and surface arrangements.)

Anti-breakage Coal Shipping Apparatus. Coal Merchant, Vol. 24, 591, pp. 55-6, 4 fig. (Particulars of the Handrock appliance with endless chains carrying steel plate trays, upon which the coal travels.)

The Largest Naval Collier in the World. K. G. Martin, Marine Engineering (N. Y.), Vol. 16, 12, pp. 495-8, 3 ill. (Characteristics of U. S. A. fleet collier "Cyclops." Description of deck arrangement and coal-handling machinery.)

XXV—SANITATION, DISEASES

Colliery Cottages and Surface Buildings. J. Perkin, Iron Coal Trades Rev., Vol. 83, 1911, 2286, pp. 1022-3, 9 fig.

Model Concrete Village for Coal Miners. Concrete, Vol. 12, 2, pp. 40 and 60-7, 13 fig. (A village of 20 double houses for 40 families, arranged around a park 300x600 ft. They are built so that the house cleaning can be mainly done with the garden hose. Many interesting devices are given.)

Coal Mine Mortality Statistics. C. L. Hoffman, Coal Age, Vol. 1, 13, pp. 400-3, 4 tab. (Tables showing the rapid increase in the death rate in North American mines.)

Miners' Baths. R. A. S. Redmayne, Coll. Guard., Vol. 103, 2663, pp. 77-8, 6 fig. (Bath installations described as at Dolwath, Cornwall, and in Belgium and France.)